TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 19.] 1922. [No. 3.

TUBERCULOSIS IN THE TROPICS:

A REVIEW OF RECENT WORK.

By Col. S. LYLE CUMMINS, C.B., C.M.G., M.D., D.T.M. & H. (Cantab.), A.M.S. (retd.), Professor of Tuberculosis, University College of South Wales.

Sectional Editor, Tropical Diseases Bureau.

Epidemiology.

In the *Tropical Diseases Bulletin*, Vol. 17, No. 1, of January 15, 1921, was reviewed the most notable contribution to the subject of tropical tuberculosis that has appeared in recent years. This book, entitled "A Study in the Epidemiology of Tuberculosis with Special Reference to Tuberculosis in the Tropics and of the Negro Race," is by Colonel George E. BUSHNELL, United States Army Medical Corps, and presents within one small volume the conclusions drawn by the author from a rich clinical experience of the disease. The opinion to which Colonel BUSHNELL is brought by close observation and prolonged study is that the natives of isolated areas in the Tropics and elsewhere owe their marked susceptibility to tuberculosis to the absence of acquired resistance. In this respect they are comparable to the infants and young children born in less primitive communities, and are liable to present the infantile type of generalized tuberculosis rather than the chronic pulmonary type characterized by a slow progress and a middle age death-rate, usually met with amongst the members of the industrial communities of Western Europe and the United States. In his observations as to clinical type amongst infected American Indians, Colonel BUSHNELL is in complete accord with the experience recorded by A. BORREL as the result of his observations upon tuberculosis amongst the African troops brought to France during the Great War, an account of which is given in this *Bulletin*, Vol. 16, pp. 190–2. This important conception of the epidemiology of tuberculosis is not new, having been enunciated by METCHNIKOFF and his co-workers in 1911, as well as by CALMETTE, SANARELLI and others. A notable communication on similar lines was made by H. ZIEMANN to the *Centralblatt. f. Bakteriologie* in 1913 [see this *Bulletin*, Vol. 3, pp. 232–33]. Similar views have recently been voiced by CUMMINS in a paper entitled "Tuberculosis in Primitive Tribes and its Bearing on the Tuberculosis of Civilised Communities"

(5678) Wt.P13/74 1,500 4/22 Harrow G75 O

in the *International Journal of Public Health* [see this *Bulletin*, Vol. 18, p. 62]. The publication of Colonel BUSHNELL's volume, so complete in its analysis of tuberculosis of the American Negro and of the American Indian, focuses attention in the clearest manner on this aspect of tuberculosis, and his book for this reason is certain to be of historical importance.

The lead given by BORREL in the study of tuberculosis amongst the tropical levies imported into France during the war has been successfully followed up by other observers, who have added still further to our knowledge on this subject. Amongst the more important of these are the papers by Ch. ROUBIER [this *Bulletin*, Vol. 18, p. 64], and by L. MOREAU [*loc. cit.*, p. 63], the latter giving an excellent account of the X-ray appearances in tuberculosis in Africans manifesting the disease in France. The chief interest of the paper by ROUBIER lies in his comparison of tuberculosis amongst different racial groups represented by the Algero-Moroccan troops, the Senegalese levies, and representatives of ancient civilization, such as the inhabitants of Indo-China. The Algero-Moroccans, exposed in their own country to a considerable degree of contact with Europeans, show in their clinical types a considerable degree of approximation to European tuberculosis ; the Senegalese, detached from their isolated native surroundings, tend to exemplify what is known as the infantile type of infection ; while the Indo-Chinese, living in large native agglomerations but not in touch with Europeans to any considerable extent, tend to react to tuberculosis somewhat after the manner of the growing children of Western Europe, and are thus intermediate between the Senegalese and the Algero-Moroccan levies.

To the same effect are the observations of TRABAUD in his Memoirs of Tuberculosis in the Army and in Native Troops [this *Bulletin*, Vol. 18, p. 385]. Here, too, the extreme susceptibility of the African tribes is noted ; while the observation is made that the Arabs show, on the whole, a higher resistance than the natives of Senegal, although they are far less protected than Europeans.

Similar phenomena are recorded from Morocco by COLOMBANI and VUILLET, whose papers are noticed in this *Bulletin*, Vol. 18, p. 384.

The important contributions of CARBONELL and A. FONTES [*loc. cit.*, pp. 66 and 386] show that the same influences are at work in the Argentine Republic and Brazil.

Pathology.

A paper of the highest importance upon tuberculosis in the Tropics, and indeed upon tuberculosis in general, from the pen of Dr. H. H. SCOTT, appears in the *Annals of Tropical Medicine and Parasitology*, Vol. 15, No. 3, of September 30, 1921, and a full summary of this work, both as recorded in the paper referred to and also in a slightly fuller manuscript report, dated June 8, 1921, and received from the Colonial Office, appears in this *Bulletin*, Vol. 18, pp. 376–9. This work is founded upon an analysis of the post-mortem findings in 300 consecutive cases of death from tuberculosis, with special reference to the disease as met with in children in Hong Kong. On the whole the findings of Dr. SCOTT correspond with those of GOHN and of CANTI. SCOTT, however, notes a certain number of cases in which tuberculosis of the glands at the hilus or in the mesentery was found to be present although no focus could be discovered in the lung or in the intestine. These cases however were exceptional and, as a rule, a lung focus

was found corresponding to the gland infection at the root, while intestinal ulceration was found to have occurred in the areas drained by lymphatics leading to enlarged mesenteric glands.

Treatment.

The researches that have led to recent discoveries bearing upon the treatment of leprosy by means of the unsaturated fatty acids of chaulmoogra and other oils, and by the ethyl esters of these acids, have naturally had their repercussion upon the treatment of tuberculosis; and the work of ROGERS, MUIR, DEAN, McDONALD and others has been applied to the tubercle bacillus. So far there are no conspicuous successes to record, but some highly important observations by WALKER and SWEENEY, and by LINDENBERG and RANGEL PESTANA, with regard to the effects of these preparations upon acid-fast bacilli *in vitro* have been reviewed in this *Bulletin*, Vol. 17, p. 277, and Vol. 18, p. 390. WALKER and SWEENEY demonstrate clearly that the unsaturated fatty acids of chaulmoogra oil have a specific bactericidal action upon acid-fast bacilli. They associate this specific action with the fact that the acids of this series differ from all other known fatty acids in that their atoms are arranged as a closed carbon chain or ring. These acids, while without harmful effect on the bacillus coli and similar organisms, are capable of killing the bacillus of rat leprosy in 24 hours, even when diluted to 1 : 75,000; while they prevent the growth of tubercle bacilli in a concentration of 1 : 10,000. In these observations lies some hope for future progress, but there seems reason to think that the greater toxicity of the tubercle bacillus as compared to the bacillus of leprosy is likely to make the new preparations less applicable to the treatment of the former than of the latter disease.

Several communications relating to the tuberculosis of miners in the Commonwealth of Australia and in South Africa have been reviewed in this *Bulletin*, Vol. 18, No. 5. These papers, though more important from their bearing on industrial than on tropical tuberculosis, deserve careful study, especially where they relate to the African natives employed in the mines of the Transvaal. It is sufficient to say that the papers so far received are unanimous in calling attention to the great susceptibility of African natives to rapid and progressive infections with the tubercle bacillus when brought into association with European miners, and the trouble appears to be accentuated by the inhalation of the silica dust which so frequently occurs in the mining industry.

LEISHMANIASIS: A REVIEW OF RECENT LITERATURE.

By C. M. Wenyon,
Sectional Editor, Tropical Diseases Bureau.

II. Oriental Sore.

The chief advances which have been made in our knowledge of oriental sore fall into three categories. Firstly, there is the gradual accumulation of evidence that species of Phlebotomus may be the carriers of the disease, at least in the Old World; secondly, the wide distribution of leishmania infections in South and Central America, where an exceedingly chronic disease exists, which, though mostly of the cutaneous variety, in 10 to 20 per cent. of the cases extends to the naso-pharynx; thirdly, the great advance made in the treatment of the disease by the discovery of the specific remedy, tartar emetic.

Distribution.

The most remarkable feature of the distribution of oriental sore is the well-known fact that in certain countries the endemic centres are sharply marked off from those of kala azar. In India, oriental sore occurs in the districts north-west of a line joining Cambay and Delhi, while kala azar is found only east of this line. A similar condition maintains in North Africa, where kala azar is found in the districts round Tunis, while oriental sore is found chiefly at Gafsa, about 2 degrees further south. Recent records show that this distribution still maintains. In other areas it appears that such a demarcation does not exist. Both kala azar and oriental sore occur in the districts around the Caspian Sea, von Petersen (1914) having obtained details of 1,200 cases in Turkestan. The same is very largely true of the Mediterranean littoral, and of the Blue Nile districts of the Sudan.

Oriental sore in the Eastern Hemisphere has a wide distribution in the part of India already indicated, Arabia, Persia, Mesopotamia, the Caspian region and, generally speaking, all the countries bordering on the Mediterranean. Martoglio (1912) has recorded the disease from Abyssinia, while Wagon (1914) has seen it in Dahomey, in Nigeria, and Bouilliez (1917) in the French Congo. The disease had previously been noted in the Niger district by Stévenel (1911) and Benoit-Gonin (1911). The most interesting recent observation is that of Ravaut (1920), who has diagnosed a case in France in a girl who became infected at Beixas in the Eastern Pyrenees. Another case reported by the same observer appears to have originated in Spain, where the disease was first recorded by Camacho (1914).

Castellani (1913) reported a case of oro-pharyngeal leishmaniasis in Ceylon, while similar cases have been recorded by Christopherson (1914) and Susu (1917) from the Blue Nile district of the Sudan. These are of interest in that they exhibit a type of the disease which is common in South America, but exceedingly rare in the Old World, where the lesions are almost exclusively of the cutaneous variety.

Since the discovery by Lindenberg (1909) and Carini and Paranhos (1909) of leishmania in the ulcer of Bauru in Brazil, and the

demonstration by CARINI (1911) of the presence of the parasites in the nasopharyngeal lesions, which are often associated with the cutaneous condition, numerous records of the distribution of the disease in South America have been published. It has a wide distribution throughout Brazil, but the whole of the northern half of South America and Central America contain endemic centres of the disease, which is especially prevalent in the virgin forest regions which are in process of development in connexion with new railway construction. It must not be supposed that involvement of the mucosa of the nose, mouth and pharynx occurs in every case of leishmania infection in South America. In Brazil, according to DA SILVEIRA (1920), this condition occurred in 20 per cent. of 15,000 cases seen at S. Paulo between 1914 and 1919. INCHAUSTEGUI (1918) finds that in certain parts of Mexico amongst the chicle gum gatherers there may be an incidence of dermal leishmaniasis of 50 per cent., the ear being the most common site of the lesion. The disease had previously been reported from Yucatan by SEIDELIN (1912) and RODRÍGUEZ ARJONA (1915). BATES (1913) has, however, recorded a case from Panama, which showed involvement of the nasal mucosa. In the Guianas the disease, which is known as Forest Yaws, Boschyaws or Pian Bois, and was first shown to be due to leishmania by NATTAN-LARRIER, TOUIN and HECKENROTH (1909) and FLU (1911), seems to be limited almost exclusively to the skin. THÉZÉ (1916) pointed out that the mucosae were rarely affected and that spontaneous healing of the cutaneous sores occurred in 2 or 3 years. BONNE, however (1918), has seen cases in Guiana in which the nasal mucosa was involved. ITURBE (1917) first recorded the disease from Venezuela. It has been studied in Colombia by TEJERA (1920), who finds that the mucosae are rarely affected. MIGONE (1913) and LINDSAY (1914) have described the disease from Paraguay ; STRONG and his co-workers (1913) met with cases in Peru, while ESCOMEL (1917) gives an account of the disease as it occurs in Peru and Bolivia.

Natural Disease in Animals.—Though many observers had noted that dogs are liable to an ulcerative condition of the head in endemic centres of oriental sore, it was not till 1913 that NELIGAN demonstrated leishmania in these lesions in dogs in Teheran. In one dog there appeared to be a general infection at the same time. GACHET (1915) observed ulcers in 15 of 21 dogs examined at random in Teheran. Leishmania were found in these lesions. YAKIMOFF and SCHOKHOR (1914) found the parasites in sores on dogs in Tashkent, while PEDROSA (1913) recorded the discovery of leishmania in an ulcer on the nose of a dog in an endemic centre of the human disease in Brazil, the only instance of a natural infection in South America.

Clinical.—Of the few clinical records worthy of note attention may be called to the cases of involvement of the mucosae of the nose and mouth recorded by CASTELLANI (1913) in Ceylon, and by CHRISTOPHERSON (1914, 1917) and SUSU (1917) in the Sudan. In CASTELLANI's case it appears that the disease commenced as an ulceration of the soft palate without any primary skin lesion. It is a remarkable fact that neither oriental sore nor kala azar occur in Ceylon, so that further information about cases of this kind is desirable. The two cases described by CHRISTOPHERSON (1914) and SUSU (1917) resembled the South American form of the disease, as there was involvement of the nasal mucosae which appeared to have arisen from an extension of ulcers on the neighbouring skin. There was also injection of the gums and hard palate. From the

figures produced it would appear that these conditions were actually due to leishmania, though it is remarked that the organisms were exceedingly scanty and difficult to find. It has always to be remembered that under certain conditions, yeasts may simulate leishmania very closely.* That the second Sudan case, first seen by SUSU and subsequently treated by CHRISTOPHERSON (1917) rapidly recovered under tartar emetic, though the disease had been in progress for four years, is a point in favour of its leishmania nature. The photographs of these two Sudan cases are strikingly reminiscent of the numerous illustrations which have appeared of the severe naso-pharyngeal type of the disease in South America.

An unintentional inoculation experiment conducted on himself by BOUILLIEZ (1917) is of interest, in that it gave rise to a type of infection not observed under natural conditions. Fluid from a mouse infected with *L. tropica* was accidentally introduced into the eye. Four months later a small nodule appeared on the conjunctival surface of the lower lid. It increased in size till it reached that of an almond. Numerous leishmania were discovered in the lesion. Cure was brought about by intravenous injections of tartar emetic. It is a well-known fact that it is easy to reproduce the disease in man by inoculation of the skin with virus from an oriental sore.

The cutaneous lesions of the South American disease appear to be more chronic in character than the oriental sore of the East. In some cases there is a tendency for the lymphatic system draining the affected area to become involved. WERNER (1911) drew attention to this conditionand demonstrated leishmania in the enlarged glands. Quite recently DE AGUIAR PUPO (1921) has described a case in which swellings appeared along the course of the lymphatics of the leg. These broke down, producing ulcers in which leishmania occurred.

Diagnosis.

As regards the diagnosis of oriental sore, the discovery of the parasite is the only method which gives reliable information. The organism can be found in smears made from material obtained by scraping the granulations, after removal of the scab if such be present. Very frequently, however, the leishmania obtained in this manner are scanty in numbers and in a degenerate state owing to the adverse conditions resulting from secondary bacterial invasion and the resulting pus formation. More normal forms can be obtained, in cases which have commenced to ulcerate, by running a fine glass pipette into the base of the ulcer through its marginal skin. Sometimes it may not be possible to find parasites even in this way. A diagnosis may occasionally be made in such cases by the culture method. This is best carried out by sterilizing the marginal skin of the ulcer with iodine and running in a fine glass pipette through a puncture made in the skin, the object being to get beneath the ulcer so as to obtain material free from bacterial contamination. With the cells in the

* In this connexion it is perhaps worthy of note that HUNTEMÜLLER (1914) described a new parasite from Jericho Boil under the name of *Plasmosoma jerichoense*. The writer was able to examine preparations containing this supposed organism. It was evident that it was merely a badly fixed leishmania. Jericho Boil is now known to be oriental sore. Similarly, CHALMERS and KAMAR (1920) recorded as *Toxoplasma pyrogenes* Castellani, 1913, certain structures which were found post mortem in a case of febrile splenomegaly from the Barun district of the Sudan. This district is known to be an endemic centre of kala azar, and from information the writer has received he is in a position to state that the supposed Toxoplasma was merely a degenerate and altered leishmania.

pipette, N.N.N. medium is inoculated. In heavy infections, flagellates appear in 48 hours, but in very scanty ones three weeks may elapse before they are present in the medium in sufficient numbers to be recognized.

Treatment.

As pointed out in the section on kala azar, intravenous medication with tartar emetic was first introduced by GASPAR VIANNA in the treatment of the dermal and mucosal leishmaniasis of South America. Since then it has been employed in the treatment of oriental sore in the Old World. The number of records of its use do not appear to be as great as might be expected. SCOTT (1917) was the first observer to publish an account of the treatment of oriental sore by this method. He was successful in 63 cases of Frontier Sore in India. Unfortunately, leishmania were found only in 4 of 27 cases examined microscopically. SINTON (1917) cured six diagnosed cases in a period of 8 to 37 days. CHRISTOPHERSON (1917) obtained a good result in a severe case in the Sudan; though the disease had been in progress for four years rapid recovery took place. GREIG (1917) treated 18 Mesopotamia cases, with recovery in 17, in a period varying from 16 to 52 days. BOUILLIEZ (1918) was cured of an accidental infection of the conjunctiva by intravenous tartar emetic after injections of luargol, 606, and neo-salvarsan had failed. LOW (1920) and PATRICK (1920) report the cure of single cases, while SINTON (1921) gives a further account of the treatment of six cases in Turkestan. He remarks that in this district the disease appeared to respond more readily to intravenous tartar emetic than in Mesopotamia, where he had had previous experience. The fact that oriental sore in the Old World is a comparatively benign disease which invariably cures itself usually in 6 to 18 months, and is followed by no serious consequences save the scar, is probably the reason why intravenous injections of tartar emetic have not been employed in its treatment as freely as in kala azar. Large numbers of cases of oriental sore occurred during the war amongst troops in Mesopotamia, and many medical men were reluctant to adopt the intravenous medication with tartar emetic for a disease which was accompanied by no constitutional disturbance and which was known to be self-curing. Thus ORMEROD (1920) says that intravenous tartar emetic is efficacious but appears to be a drastic line of treatment for a localized skin lesion. It also requires detention of the patient in hospital. SINTON (1917), however, writes that the danger of the intravenous tartar emetic treatment seems slight if care is taken not to push the drug to excessive limits and to see that the patient has no kidney trouble before starting a course of treatment. The scarring left after this method seems less than after any other. It gives much less trouble to both physician and patient, besides being very much quicker than the usual means.

GREIG (1917) gave an account of 76 cases which had been sent to Karachi from Mesopotamia. With a view to obtaining comparative data of different methods of treatment, the cases were divided into five groups as follows :—(1) Control cases untreated, 24 ; (2) Intravenous injections of tartar emetic, 18 ; (3) Intravenous tartar emetic together with local inunctions with tartar emetic ointment in strength increasing from 2 to 15 per cent., 14 cases ; (4) Oral administration of tartar emetic together with inunction, 17 cases ; (5) Inunction only, 3 cases. The results, which are somewhat vitiated from the fact that the majority

at least had been subject to previous treatment in Mesopotamia, are set forth in the following table:—

TABLE I.

	Groups.				
	1	2	3	4	5
No. of cases	24	18	14	17	3
Average duration of disease to admission to hospital	2·5 (months)	2·6 (months)	2·8 (months)	2·3 (months)	3 (months)
No. of days cases were under observation in hospital :—					
a. Average	21·9	28·2	32·7	25·1	18·6
b. Maximum ..	54	52	59	59	17
c. Minimum ..	5	16	19	4	15
No. of cc. of 1 per cent. A.T. administered intravenously :—					
a. Average	Nil	71·5	83	Nil	Nil
b. Maximum ..	Nil	150	179	Nil	Nil
c. Minimum ..	Nil	20	22	Nil	Nil
No. of cases :—					
Healed	20	17	13	12	3
Improved	1	0	1	1	0
Not healed	3	1	0	4	0

As the untreated cases only persisted for an average of 21·9 days, it is evident that many of the cases were well on the road to recovery when they came under observation. The method of administering tartar emetic intravenously for oriental sore is the same as that employed for kala azar.

Local Treatment.—The older methods of treatment by excision and the application of escharotics, such as powdered permanganate of potash and carbon dioxide snow, have had their advocates in more recent literature. Though these methods undoubtedly suffice in many cases to bring about a rapid cure, attempts have been made to find a more specific local treatment which will be less drastic.

Treatment by Tartar Emetic Ointment.—LOW (1915) successfully treated a case by the application of a 2 per cent. tartar emetic ointment. Another case was treated by LOW (1920) with this ointment as well as by intravenous injections of tartar emetic. In the table given above, GREIG (1917) records the successful treatment of three cases by means of the ointment; it is admitted, however, that these cases were recovering when they arrived in hospital. In LOW's first case, treatment with salicylic acid ointment and methylene blue ointment for five weeks had only made the sore worse. Tartar emetic ointment was then applied daily for a fortnight, when it was stopped and replaced by a simple dressing. A complete healing had taken place three weeks later. In the second case, tartar emetic injections were

given twice a week for three weeks, but these were discontinued owing to attacks of malaria, and local treatment with ointment was commenced a week later, with the result that the sore had healed in a month.

Treatment by X-rays.—This line of treatment was adopted in Mesopotamia during the war. The best account is given by ORMEROD (1920), who found it to be the most practicable method for the following reasons :—(1) The rays act directly on the causative organism ; (2) They are able to penetrate unbroken skin or masses of diseased tissue, thereby being efficient in ulcerated and non-ulcerated sores alike ; (3) Cases can be treated as out-patients and can very often continue their occupation ; (4) There is no risk of constitutional disturbance, the danger of dermatitis or necrosis being absent with the doses used ; (5) The treatment is short, painless, and easy to administer ; (6) Sores in awkward positions such as the inner canthus of the eye, lips and alae nasi can very readily be dealt with ; (7) The scars left after healing are supple and of such a colour in about six months as to be barely noticeable. Of 84 cases, showing in all 136 sores, the average time from the commencement to complete healing of the sores was 27 days, with a minimum of 10 days and a maximum of two months. The description of the technique is given in full in this *Bulletin*, Vol. 17, p. 364. MITCHELL (1921) states that at a Basra hospital after a trial of every possible method of treatment it was found that a single full pastille dose of X-rays produced a cure in 10 days in the majority of cases. TRESTON (1921) also reports good results from X-ray treatment.

Treatment by Ionization.—EVANS (1918) found this method to give most satisfactory results. The ulcer is cleared of all septic material and crusts and is covered with a pad extending for half an inch beyond the edge of the sore. The pad consists of 16 layers of lint soaked in 2 per cent. zinc sulphate solution and is firmly applied to the ulcer under a zinc electrode by means of a bandage. The pad is connected with the positive pole of the current. The indifferent pad, which must be of much larger size, is placed on any convenient part of the body. An arm or a leg bath with saline solution may replace the indifferent pad. The current is supplied by 18 accumulators, giving an average of 36–38 volts. This is connected with a short resistance so that the current can be gradually increased. A patient with a sore having an area of about one square inch is usually able to stand 10 milli-ampères. The application is continued for 20 minutes, during which the pad is constantly moistened with zinc sulphate solution. Of eight cases cured at the time of writing, the number of applications and the number of days required for the sore to heal were 5–30, 4–22, 5–36, 2–6, 5–8, 3–8, 2–7 and 6–12 respectively. MACCORMAC (1919) treating a case by ionization with sodium hypochlorite obtained rapid healing.

Treatment by Injection of Emetine.—PHOTINOS (1920) described a new method of treatment for oriental sore in Crete, which he had found efficacious in 23 cases. He injected a solution of emetine hydrochloride around and below the sore, both subcutaneously and intracutaneously. For a small sore the total amount of the drug necessary was 0·01 gm., while for large sores he used 0·05 gm. The injections are made with a fine needle and the solution is forced into the skin at various points in the whole area around the sore. In sores which require the above doses only one sitting is necessary,

complete healing taking place after the lapse of 15 to 30 days. In larger sores or multiple lesions it is necessary to inject the requisite quantity of drug at intervals of a few days. CALICETI (1920) treated two cases of Sicilian origin by this method. Two injections were given of 8–10 cgm. of emetine hydrochloride and cure was complete in three weeks.

Other Methods of Treatment.—GRAY (1921) reports that during 1917 and 1918, in Mesopotamia, he treated over 200 cases of oriental sore by scraping and cauterizing with carbolic acid. The average length of time required to bring about a cure was 17 days, and it was his experience that relapse was uncommon and the scars less obvious than after other methods of treatment.

DUCKWORTH (1921) states that he found the following method very efficacious in Mesopotamia. After cleaning the sore a piece of lint the exact size of the ulcer was soaked in a solution of urotropin (1 drachm to the ounce) and applied to the sore. The applications, which are made twice daily, are accompanied by continued healing of the sore. TRESTON (1921), from experience gained in Mesopotamia, advocates the following lines of treatment :—(*a*) For sores in the early stages, X-ray applications and crystals of potassium permanganate ; (*b*) For fairly advanced cases, crystals of potassium permanganate and intravenous tartar emetic ; (*c*) For sores in the advanced stages, thorough scraping under chloroform and application of ol. ricini dressings ; (*d*) For sores on the face, other than those in very early stages, intravenous tartar emetic.

For treatment of the more serious type of the disease met with in South and Central America, GASPAR VIANNA's treatment by intravenous injections of tartar emetic is still mostly employed. There have been many reports of the good results following its use. It is admitted that the drug acts more readily on the purely cutaneous condition, though frequently remarkable recoveries occur in the more serious naso-pharyngeal cases with long histories extending over many years. TORRES (1920) describes the method of treatment in detail. It consists in the injection of 0·06 to 0·07 of a gm. as an initial dose, increasing at each injection by 0·02 gm. up to a dose of 0·12 to 0·14 gm. After fifteen of these injections, a week's rest from treatment may be necessary. At the same time the local skin and pharyngeal or nasal lesions are treated with a 0·1 per cent. solution of tartar emetic. Some cases, however, do not respond to this treatment, in which case "protosan," a preparation made by the Instituto Oswaldo Cruz, has been used with advantage. He describes one case which had 248 separate lesions on different parts of the body. Treatment with tartar emetic and protosan was being carried out with definitely good results when the patient contracted a fatal pneumonia. TEJERA (1920) records the case of an Englishman who had a sore on the ear : 50 injections of 10 cgm. of tartar emetic were given without any but a temporary improvement. ESCOMEL (1917) states that he has successfully treated several cases as out-patients with Martindale's oxide of antimony solution. An injection of 6–8 cc. can be given each week or 1–2 cc. every two days. The drug keeps well and can be given subcutaneously, intramuscularly or intravenously.

It is evident that for some reason not properly understood tartar emetic occasionally fails to effect a cure in the South American disease. This is also true to some extent of the more benign oriental sore of the Old World.

Animal Experiments.

NICOLLE and SICRE (1908) first showed that inoculation of the skin of monkeys either with virus from a human sore or with culture of *Leishmania tropica* was followed by the development of a sore in which leishmania could be demonstrated. NICOLLE and MANCEAUX (1910) proved that dogs were similarly susceptible. Since then, many animals have been successfully inoculated by LAVERAN and others; the outcome of these experiments clearly demonstrates that oriental sore of both the Old and New World can be readily produced in dogs and monkeys, and with less certainty in other animals. GONDER (1913) was the first to show that a general infection in mice could be produced by intraperitoneal or intravenous injection of culture of *L. tropica*. In the infected animals there was great enlargement of the liver and spleen, while there developed on the legs, tail and head, oedematous swellings which finally ulcerated. In all these lesions, leishmania was found. GONDER noted that in infections produced with the virus of infantile kala azar, no skin lesions resulted. It was possible to hand on the infections from mouse to mouse by sub-inoculation. Extensive experiments with mice were conducted by LAVERAN from 1914 onwards. He was able to confirm GONDER's results as regards the production of a general infection and the skin lesions, and further demonstrated that some of the mice acquired a heavy infection of the tunica vaginalis which caused such a thickening of this structure as to give rise to visible tumours. The infection was inoculable from animal to animal, but it was only in certain mice that the heavy infections occurred. In severe infections there was swelling and ulceration of the legs, feet and head, while the lesions sometimes revealed leishmania in enormous numbers. Recovery from the milder infections was the rule, and, as had been previously shown by NICOLLE in the case of monkeys and dogs, the recovered animals were susceptible to reinoculation. Many observers have failed to infect mice, so that it appears that it is only occasionally that a strain is obtained which is pathogenic to these animals. LAVERAN was also successful in infecting guinea-pigs, rats and gerbils.

An exhaustive account of experimental inoculation of both *Leishmania tropica* and *Leishmania donovani* is to be found in LAVERAN's treatise on Leishmaniasis published in 1917.

Transmission.

Oriental Sore in the Old World.—Of the many theories as to the mode of transmission of oriental sore which have been propounded, that which is received with most favour at the present time attributes it to the bite of the sand fly, a view which was first suggested by PRESSAT in 1905. In the same year the brothers SERGENT attempted to produce an infection by the bites of this insect at Biskra. In 1911 the writer suggested the sand fly as a possible vector in Baghdad. In 1915, SERGENT (Ed. & Et.), LEMAIRE and SÉNEVET attempted to produce infection in man, monkey and mouse by the bites of *Phlebotomus minutus*, and also by inoculation of the skin with crushed flies; the results were negative. ACTON (1919) drew attention to the fact that the sites of Phlebotomus bites on the body corresponded with those of oriental sore as it occurred in Mesopotamia, and that the bites of other insects did not thus correspond. In 1911 the writer discovered that 6 per cent. of Phlebotomus in

Aleppo harboured a flagellate of the leptomonas type, an observation which was confirmed by MACKIE (1914) in *Phlebotomus minutus* in India, and by LAVERAN and FRANCHINI (1920) in *P. papatasii* in France. PATTON (1919) stated that both *P. minutus* and *P. papatasii* were known to harbour the flagellate in Mesopotamia, yet in 1922 he writes that *P. papatasii* is infected in Palestine and *probably* in Mesopotamia. Cultures of the flagellates were obtained by LAVERAN and FRANCHINI in N.N.N. medium and with them they claim to have produced a general infection in mice and guinea-pigs, and on the skin of dogs local lesions resembling oriental sore. The incrimination of the sand fly has been taken a stage further by the brothers SERGENT, PARROT, DONATIEN and BÉGUET (1921), who describe the production of an oriental sore on the arm of a human being in Algiers two and a half months after a scarified area of the skin of the arm had been treated with saline solution in which had been crushed seven *Phlebotomus papatasii*, collected at Biskra three to four days before. On August 16 and 17, 1921, a batch of 94 sand flies was collected at the military hospital of Biskra, a well-known endemic centre of oriental sore. They were despatched to Algiers, where the disease is not known, a distance of 600 kilometres. Only seven *P. papatasii* arrived alive. These were broken up in saline solution and the fluid applied to a scarification in the upper third of the forearm of a human being. The wound healed without leaving any trace. Two months and twenty-four days after the experiment a small papule with central incrustation was noted at this spot. It was examined the next day and was found to contain numerous leishmania as in oriental sore. It is interesting to note that in the fluid applied to the sore no flagellates nor other organisms were visible.

This experiment demonstrates that the *P. papatasii* can harbour for at least three days a virus which is able to produce a lesion resembling oriental sore in its characters, in the parasites it contains, and in the length of the incubation period required for its development.

As the observers remark, it is only by further work that it will be possible to determine the origin of the virus in the fly, whether derived from a reservoir or a flagellate infection natural to these flies, and the exact mechanism of infection in nature.

Another aspect of the sand fly problem is the view first enunciated by SERGENT, LEMAIRE and SÉNEVET (1914), that the gecko (*Tarentola mauritanica*) may act as a reservoir for the virus of oriental sore. In support of this view they note that the lizard is ravenously fed upon by sand flies, and, furthermore, that a flagellate of the leptomonas type was culturable from the organs of 15·7 per cent. of the geckos. LAVERAN (1915) attempted without success to infect geckos with *Leishmania tropica*. The presence of the flagellate in geckos was again noted by CHATTON and BLANC (1918), who, moreover, obtained a temporary development in bed bugs fed on geckos, an observation which may throw some light on the behaviour of leishmania in these insects. Later in the same year these observers found that the geckos of Tunis were free from the flagellate found in the animals further south. They accordingly inoculated geckos intraperitoneally with cultures of *Leishmania tropica*. In one experiment three cultures from the blood were positive in three of twelve geckos which had been inoculated one, twelve and thirteen days before. In another experiment in which the geckos were left at a temperature of 22° and 23° C., three out of four were positive on the twelfth day. NICOLLE, BLANC and LANGERON (1920) repeated these experiments and found that the flagellates occurring in cultures of the natural

gecko flagellate were morphologically distinguishable from those in cultures of *Leishmania tropica.* The blood of a naturally infected gecko was inoculated intradermically to a man on two occasions and also to a monkey, while three men and a monkey were inoculated with cultures of the flagellate. No infection occurred in any case. They also failed to produce an infection in uninfected geckos by inoculating the blood of infected geckos and cultures of the flagellate. They conclude that the flagellate is only accidentally present in the blood of geckos and that it is probably of intestinal origin. LAVERAN and FRANCHINI (1921) found that the blood of geckos of Italy also harboured this flagellate, while FRANCHINI (1921) discovered that a flagellate of the leptomonas type also occurred in the rectum, thus upholding the view of NICOLLE, BLANC and LANGERON, that the blood flagellate was the result of accidental invasion of an intestinal form. On the whole there seems to be little real evidence that the gecko plays the part of reservoir for the virus of oriental sore.

PARROT (1919) records an observation which is of interest in the light of the gecko experiments just described. Eight female sand flies and six geckos were brought in a cage from a place where oriental sore is endemic to another where the disease does not occur. The flies escaped and three months later three individuals in the house developed oriental sore. One of these was the medical man who had collected the flies and had been exposed to infection elsewhere, but the other two had not been in an endemic zone for one, and three and a half years respectively. Even supposing the disease was caused by the escaped flies, there is no proof that they were not already infected when caught.

Bed Bug.—PATTON, who was the first to suggest the bed bug as a vector for oriental sore in Cambay in India, still maintains that this is the carrier so far as Cambay is concerned, though he believes (PATTON, 1919) that in Mesopotamia the sand fly is to blame. His reasons, which have been restated in a recent paper (1922), for suspecting the bed bug are that he considers the parts of the body most usually bitten by bugs are those in which oriental sore most commonly occurs, that the parasite *Leishmania tropica* becomes a flagellate in the stomach of the bug, as was first demonstrated by the writer (1911), and that he has been able to discover development in the stomach cells of bed bugs like that described by Mrs. ADIE (1921) for *Leishmania donovani.* It does not appear, however, that this development was seen in living bugs. CORNWALL and LA FRENAIS (1922) conducted experiments with both *L. tropica* and *L. donovani* with a view to obtaining evidence of an intracellular stage. The bugs were fed on cultures and at varying times after feeding the gut was removed, fixed and sectioned. By this technique the exact relation of parasite to cells is maintained. Though heavy flagellate infections of the lumen of the gut were found, there was no evidence of any intracellular stage, an observation which is in support of the view expressed in Part 1 of this Review (p. 15) that the intracellular stages observed by Mrs. ADIE and by PATTON possibly represented merely a culture in dead or dying cells. CORNWALL and LA FRENAIS also state that the thick-tailed form of the parasite in the bug, first seen by CORNWALL, is a form which has no place in the true cycle of development of the flagellate. There seems to be even less evidence in favour of regarding the bed bug as a carrier of oriental sore than of kala azar. Mrs. ADIE (1922) telegraphs that she has found a swarming infection of Leishman-Donovan bodies in the salivary glands and ducts of a bed bug taken from the bed of a

suspected case of kala azar.* This discovery possibly provides further ground for suspecting the bed bug, but cannot, as she claims, supply the positive proof that kala azar is transmitted by the bite of the bug. There was no evidence that this particular bug had fed upon a kala azar case, nor that the flagellate observed was actually the kala azar parasite, which cannot be distinguished on morphological grounds from many purely insect flagellates occurring not only in the intestine but also in the body cavity, salivary glands and other organs of insects.

House Fly.—Blanc and Caminopetros (1921) conducted an inquiry into the distribution of oriental sore in the Island of Crete. No evidence of any vertebrate reservoir of the disease could be obtained and they concluded that man is the only host, and that the disease is handed on from one to another by direct contact. Flies were allowed to feed on sores and five hours later the legs and heads were crushed in a drop of liquid from N.N.N. medium, which was then inoculated into the skin of the arm. No sores had developed after four months' observations. It is concluded that flies play no part in the carriage of the infection. These observers, however, have overlooked the possibility that flies may take up leishmania from a sore and pass them in their faeces on to an abrasion of the skin of another person within five minutes, as was shown by Wenyon and O'Connor (1917) to occur in the case of Trichomonas.

Leishmaniasis of South America.—Direct observations on the means of transmission of the leishmaniasis of South America are few and far between, though there has been much speculation as to the possible vector. Biting flies, such as Tabanidae and Simulidae, as also ticks, have been suspected, but there is no experimental evidence to support these theories. Townsend (1915), conducting investigations in Peru, suspected Chironomidae of the genus *Forcipomyia* as transmitting the disease. He found leishmania forms of a flagellate in the intestine of the flies, and by inoculating a guinea-pig in the skin with crushed flies, produced a papule in which he stated scanty leishmania forms occurred.

Now that Phlebotomus is generally regarded as the vector of oriental sore in the Old World, an American species, *P. lutzi*, is being suspected as playing a rôle in the spread of the American disease. So far there is no experimental evidence of this, but Cerqueira (1920) relates the experience of a professor of Bahia who developed a typical sore at the site of the puncture made by one of these flies. He states that four instances of a similar kind have come to light.

On the question of the relationship of the insect flagellates to *Leishmania tropica* and the culture of the flagellate, there is nothing to add to the remarks which were made in Part I of this review, save that the instance of the viability of the parasite in the cadaver referred to in connexion with the culture of *L. donovani* was an observation of Pedrosa (1917) of the successful culture of leishmania from a cutaneous ulcer in South America, 36 hours after death.

Prophylaxis.

Sterilization of all insect bites with iodine solution has been advocated as a means of avoiding infection, while on the assumption that the sand fly is the vector, protection from the ravages of these insects by means of sand fly nets (22 holes to the linear inch) is the natural procedure to adopt.

* From reliable information which the writer has received from India it appears that the structures observed by Mrs. Adie were neither Leishman-Donovan bodies nor stages of any other flagellate, but some totally distinct organism.

* REFERENCES.

ACTON (1919), xiv, 205.
ADIE (1921), *Indian Jl. Med. Research*, ix, Oct., 255–260.
—— (1922), *Indian Jl. Med. Research*, ix, No. 3 p. v.
DE AGUIAR PUPO (1921), *Bol. Soc. Med. e Cirurg. de S. Paulo*, iv, 97–99.
BANA (1920), xvii, 363.
BATES (1913), ii, 123.
BENOIT-GONIN (1911), *Bull. Soc. Path. Exot.*, iv, 182–184.
BLANC & CAMINOPETROS (1921), xvii, 361.
BONNE (1918), xiii, 101.
BOUILLIEZ (1917), x, 68.
—— (1918), xiii, 99.
CAMACHO (1914), Los progresso de la Clinica, Madrid, July.
CALICETI (1920), *L'Oto-Rhino-Laryngologie Internationale*, Dec. (see *Brit. Med. Jl.*, 1922, Jan. 21, Epitome of Current Medical Literature, p. 11).
CARINI (1911), *Bull. Soc. Path. Exot.*, iv, 289–291.
—— & PARANHOS (1909), *Bull. Soc. Path. Exot.*, ii, 255–257.
CASTELLANI (1913), i, 639.
CERQUEIRA (1919), xvii, 366.
CHALMERS & KAMAR (1920), xvi, 94.
CHATTON & BLANC (1918), xii, 156.
—— & —— (1918), xiv, 209.
CHRISTOPHERSON (1914), v, 274.
—— (1917), xi, 153.
CORNWALL & LA FRENAIS (1922), *Indian Jl. Med. Research*, ix, 533–547.
DUCKWORTH (1921), xviii, 241.
ESCOMEL (1916), ix, 236.
—— (1917), x, 70.
EVANS (1918), xiv, 206.
FLU (1911), *Centralb. f. Bakt.*, 1. Abt. Orig., lx, 624–637.
GACHET (1915), vii, 83.
GONDER (1913), ii, 449.
GRAY (1921), xvii, 364.
GREIG (1917), xii, 203.
HUNTEMÜLLER (1914), iii, 559.
INCHAUSTEGUI (1918), xvii, 366.
ITURBE (1917), x, 69.
LAVERAN (1917), "Leishmanioses," Paris, Masson et Cie.
—— & FRANCHINI (1921), xviii, 179.
LINDENBERG (1909), *Bull. Soc. Path. Exot.*, ii, 252–254.
LINDSAY (1914), iv, 402.
LOW (1915), vii, 84.
—— (1920), xvii, 362.
MACCORMAC (1919), xvi, 457.
MACKIE (1914), v, 262.
MARTOGLIO (1912), ii, 453.
MIGONE (1913), i, 639.
MITCHELL (1921), xvii, 364.
NATTAN-LARRIER, TOUIN & HECKENROTH (1909), *Bull. Soc. Path. Exot.*, ii, 587–591.
NELIGAN (1913), ii, 449.
NICOLLE, BLANC & LANGERON (1920), xvi, 456.
NICOLLE & MANCEAUX (1910), *C. R. Acad. Sci.*, cl, 889–891.
NICOLLE & SICRE (1908), *C. R. Soc. Biol.*, lxiv, 1096–1098.
ORMEROD (1920), xvii, 363.
PARROT (1919), xv, 442.
PATRICK (1920), xvi, 458.
PATTON (1919), xv, 442.
—— (1922), *Indian Jl. Med. Research*, ix, 496–532.
PEDROSA (1913), iii, 557.
VON PETERSEN (1914), v, 276.
PHOTINOS (1920), xvi, 457.
PRESSAT (1905), "La Paludisme et les Moustiques," Paris, Masson et Cie. [quoted by LAVERAN (1917)].
RAVAUT (1920), xvi, 457.
RODRÍGUEZ ARJONA (1915), vii, 86.
SCOTT (1917), xi, 154.
SEIDELIN (1912), i, 13.
SERGENT (Ed. & Et.) (1905), *C. R. Soc. Biol.*, lviii, 673–674.
SERGENT (Ed. & Et.), LEMAIRE & SÉNEVET (1915), vi, 227.
SERGENT (Ed. & Et.), PARROT (L.), DONATIEN (A.), & BÉGUET (M.) (1921), *C. R. Acad. Sci.*, clxxiii, 1030–1032.
DA SILVEIRA (1920), xvi, 458.
SINTON (1917), xi, 154.
—— (1921), xviii, 242.
STÉVENEL (1911), *Bull. Soc. Path. Exot.*, iv, 180–181.
STRONG & Others (1913), iii, 142.
SUSU (1917), xi, 153.
TEJERA (1920), xvi, 459.
THÉZÉ (1916), viii, 376.
TORRES (1920), xvi, 459 ; xvii, 365.
TOWNSEND (1915), viii, 12.
TRESTON (1921), xviii, 242.
WAGON (1914), iii, 558.
WENYON (1911), *Jl. London Sch. Trop. Med.*, i, 198.
—— & O'CONNOR (1917), *Jl. R. A.M.C.*, xxviii, No. 6, 686–698.
WERNER (H.) (1911), *Arch. f. Schiffs- u. Trop.-Hyg.*, xv, 581–585.
YAKIMOFF & SCHOKHOR (1914), iii, 556.

* References are to summaries in the *Tropical Diseases Bulletin* unless otherwise stated. Dates in parentheses refer to year of publication of original papers.

HELMINTHIASIS.

FISCHER (Walther). **Ueber Darmparasiten bei Gesunden und Kranken in Shanghai.** [Intestinal Parasites of Healthy and Sick in Shanghai.]—*Cent. f. Bakt.* 1. Abt. Orig. 1920. Feb. 11. Vol. 84. No. 2. pp. 135–142.

From an examination of the faeces of (1) 300 Europeans and half-castes, nearly all of whom were suffering from intestinal complaints; (2) 108 German soldiers belonging to the sanitary corps, all in good health; (3) 200 Chinese, some well, some ill, the author obtained the following percentages of infection:—

(1) With ascaris, 6 per cent. of the Europeans and half-castes, 10 per cent of the soldiers and 25·5 per cent. of the Chinese. (2) With trichocephalus, 23 per cent. of the Europeans and half-castes, 6 per cent. of the soldiers, 30 per cent. of the Chinese. (3) In oxyuris an examination of faeces does not show the number of infected persons. Oxyuriasis is, however, rare in China, both in Europeans and Chinese. (4) With ankylostoma, 1·3 per cent. of the Europeans and half-castes, 4 per cent. of the Chinese and no soldiers. Infection is rare in Shanghai, though frequent in other districts. (5) With strongyloides 1 per cent. Chinese, none in Europeans. In South China and sometimes in Indo-China infection is much more frequent. (6) Tapeworms were almost unknown. (7) With *Clonorchis sinensis*, 6 out of the 300, *i.e.*, 2 per cent., all of whom were half-castes, no soldiers and 7 per cent. Chinese: infection is due to eating raw fish. (8) Two cases of infection with *Fasciolopsis buski* were found in the Chinese. No case of *Fasciola hepatica* was observed. The rest of the article deals with the protozoa met with.

R. T. Leiper.

MOTAIS (François). **Du parasitisme intestinal en Annam.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 596–603.

During 1917, 3,010 stools from soldiers recruited from seven provinces of central Annam were examined. The following record of infection was made:—*Ascaris lumbricoides*, 72·05 per cent.; *Necator americanus*, 56·84 per cent.; *Trichocephalus trichiuris*, 9·89 per cent.; *Clonorchis sinensis*, 0·23 per cent.; Ascaris plus Necator, 39 per cent.; Ascaris plus Trichocephalus, 7·27 per cent.; Necator plus Trichocephalus, 4·81 per cent.; Ascaris plus Necator plus Trichocephalus, 3·12 per cent. *Oxyuris vermicularis* was observed 27 times. *Taenia saginata* was very common, *T. solium* much less frequent, while *Hymenolepis* was found once. *Sparganum mansoni* occurred frequently in periocular troubles. One stool containing eggs of Necator yielded an interesting culture; from 2nd to 5th day, rhabditiform larvae; from 5th to 20th day, strongyloid larvae; from 20th to 28th day, negative result; on 28th day, numerous rhabditiform larvae reappeared and persisted until the 70th day; from 30th to 64th day, larval females, corresponding to *Strongyloides stercoralis* were numerous. Flagellates were especially common from April to September.

R. T. L.

KOJIMA (Taiji) & GEI (Kôkai). [**Results of Examinations of Intestinal Parasites of the Students of the Formosa Medical College.**]—*Taiwan Igakkai Zasshi* (*Jl. of the Formosa Med. Soc.*). 1920. Feb. 8. Nos. 206–7. pp. 117–20.

The paper consists of three tables, the first of which is here reproduced. In the second table the figures are classified according to the year classes, and in the third the students are treated according to their native districts.

	Aborigines, including Chinese.	Japanese.
Number of students examined	268	30
Age	14–27	18–30
Number of cases where worm eggs were found	207 (77·2%)	16 (53·3%)
Ancylostoma duodenale	46 (17·2%)	—
Ascaris lumbricoides	123 (45·8%)	15 (50·0%)
Trichocephalus trichiuris	148 (55·2%)	14 (46·6%)
Oxyuris vermicularis	1	—
Taenia solium	1	—
Ancylostoma duodenale + *Ascaris lumbricoides*	12 (4·5%)	—
Ascaris lumbricoides + *Trichocephalus trichiuris*	69 (25·7%)	4 (13·3%)
Ancylostoma duodenale + *Ascaris lumbricoides* + *Trichocephalus trichiuris* ..	21 (7·8%)	—

Hiroshi Ohshima.

LAMBERT (S. M.). **Intestinal Parasites in North Queensland.**—*Med. Jl. Australia.* 1921. Apr. 23. 8th year. Vol. 1. No. 17. pp. 332–335. With 1 map in text.

As a result of the hookworm investigations during 1918–1920 an idea may be obtained of the prevalence of the more common intestinal parasites in the coastal belt of North Queensland. The figures given are based on the examination of approximately 95 per cent. of the population of the coastal belt from Proserpine to Cooktown—except in Ayr, where the work was not completed, and in Townsville and Charters Towers, where only schoolchildren were examined. The examinations were made primarily for hookworm infection, so that the figures of prevalence of other parasites are lower than their actual incidence.

Persons examined ..	29,745
Total infections	5,601 (18·83 per cent.)
Infection with Hookworms (*A. duodenale* and *N. americanus*) ..	4,910 (16·51 ,,)
Ascaris lumbricoides ..	31 (0·10 ,,)
Trichuris trichiura ..	336 (1·13 ,,)
Strongyloides stercoralis ..	106 (0·36 ,,)
Oxyuris vermicularis ..	126 (0·43 ,,)
Hymenolepis nana ..	87 (0·29 ,,)
Other tapeworms ..	5 (0·02 ,,)

Tables are also given showing the geographical distribution of these intestinal worms in the various regions of North Queensland. In all the cane-growing districts, except the Ayr district—which is in a belt of low rainfall—there is a heavy infection rate for hookworm. In the districts having a rainfall of over 90 inches the average hookworm infection is 24·9 per cent. In those below 50 inches the average is 2·5 per cent.

There is an unusually high proportion of the infections in childhood—especially in the age group 8 to 12; it is attributable partly to the fact that the children are barefooted and partly to the recent spread of the infection. The present generation of adults was probably not so highly infected in childhood as are the children of to-day.

R. T. L.

DA MATTA (Alfredo). **Nota sobre a fauna helminthologica na população infantil do Amazonas.**—*Brazil-Medico.* 1921. Oct. 1. Year 35. Vol. 2. No. 12. pp. 167–169.

Of 1,850 children whose faeces were examined by the author during a period of 12 years, 1,620 were found either to be suffering from verminoses or to be carriers of worms, the numbers being 748 or 46·27 per cent. in the former case and 872 or 53·83 per cent. in the latter. The author emphasizes the magnitude of the danger to the general well-being represented by this widespread infestation of the children of Amazonas with intestinal parasites, and urges that the evil be attacked with vigour. The four parasites most frequently found by the author were, in order of frequency, necator 1,270, trichocephalus 896, ascaris 822, oxyuris 340.

F. S. Arnold.

LEGER (Marcel). **Parasitisme intestinal chez les enfants à la Guyane française : sa relation avec la pureté des eaux de boisson.**—*Bull. Soc. Path. Exot.* 1921. Feb. 9. Vol. 14. No. 2. pp. 85–89.

The thesis propounded by SOULIÉ and DERRIEU that it is possible to estimate the purity of drinking waters by ascertaining the parasitological index of the population is shown by the author to be fallacious. 242 native soldiers of French Guiana were found to be carriers of parasites to the extent of 82·7 per cent. Of 92 children between 1 and 12 years old in the city of Cayenne 70 per cent. were infested. Nevertheless typhoid and paratyphoid are very infrequent and the water is one of great purity.

R. T. L.

HODSON (V. S.). **Intestinal Worms.**—*Jl. Trop. Med. & Hyg.* 1921. Sept. 15. Vol. 24. No. 18. p. 244.

The result of a heavy hookworm infection in inhibiting development has to be seen to be believed. Worm infections generally have ill effects in handicapping growth and development. Of 57 boys admitted to the Gordon College for various causes, 13 had *Taenia nana*, 1 *Taenia saginata*, 7 ankylostomiasis, 11 ascaris, 6 oxyuris, and 10 *Bilharzia mansoni*. Clinical notes are given of a woman aged 35, admitted to hospital with a history of abdominal pain for two months with great increase in three days. The abdomen was rigid and there was all the appearance of general peritonitis. On opening the abdomen

a large collection of pus was found among the intestines, which were matted together. A drainage tube was inserted and in the particularly evil-smelling pus discharged two segments of *T. saginata* were found later. A large mass of this tapeworm was passed per rectum after treatment with male fern. The wound healed.

R. T. L.

VON GOTTBERG (J.). **Studien ueber die Zunahme der Häufigkeit von Darmparasiten bei Kindern im Kriege. Ein Beitrag zu ihrer Diagnostik und Therapie.** [Increase of Frequency of Intestinal Parasites of Children in the War. Their Diagnosis and Treatment.]—*Arch. f. Kinderheilkunde.* Stuttgart. 1921. Apr. 16. Vol. 69. No. 3–4. pp. 161–184.

Of 200 children in Bonne examined in the summer of 1919 at the Medical Poliklinik, 125, *i.e.*, 62·5 per cent. were found to have worms. Compared with earlier statistics there has been an increase in helminthiasis of late years. The number of ascaris and oxyuris hosts is especially high among town children, whereas an increase is not noticeable among country children.

R. T. L.

FÜLLEBORN (Friedrich). **Die Anreicherungen der Helmintheneier mit Kochsalzlösung.** [Concentration of Helminth Eggs by Salt Solution.]—*Deut. Med. Woch.* 1920. June 24. Vol. 46. No. 26. pp. 714–715. With 1 text fig.

The following is a new modification of KOFOID and BARBER's method for the examination of faeces for ova of helminths.—In a glass of about 200 cc. capacity is placed a mixture of 1 part of faeces (normal consistency) to 20 parts of concentrated salt solution. The whole is made into a thinnish mixture of even consistency. The glass should be filled about 7–8 cm. high. In this mixture the eggs rise rapidly to the surface, where the greatest number are to be found in from half to three-quarters of an hour. After several hours they disappear from the surface. Not only ancylostoma, necator and trichostrongylus eggs but also ascaris eggs can be examined by this method. Ascaris eggs rise more slowly to the surface than ankylostome eggs, so that even after one hour or more an examination may give negative results.

The method is excellent for the eggs of *Hymenolepis nana*, whereas eggs of *Hymenolepis diminuta* sink again after three-quarters of an hour. *Taenia saginata* and oxyuris eggs can also be searched for by this method, although Telemann's method may prove better. The method is not applicable to bothriocephalus or trematode eggs, nor to strongyloid larva. The author did not find it successful for amoeba or lamblia cysts but it proved very satisfactory for coccidia cysts.

R. T. L.

BASS (C. C.). **Diagnosis of the Commoner Intestinal Parasitic Infections.** —*Southern Med. Jl.* 1921. Nov. Vol. 14. No. 11. pp. 863–865.

For the examination of faeces a specimen can be taken either from the stool or from the rectum direct by means of a glass tube. The most satisfactory specimens for oxyuris are made by

scraping the folds of the anus and vulva with a microscope slide or a glass rod. At least one preparation should be examined made by dissolving a particle of the faeces in water; if this is neglected strongyloides larvae and other valuable information may be missed. Finally a specimen should be prepared for the concentration of ova. The brine flotation method had been improved, but though the writer was its originator he now thinks the centrifuge method without brine is more suitable. The tube containing the diluted and strained faeces should be centrifuged just long enough to throw ova to the bottom and not longer. The time for any particular centrifuge should be determined by trial.

R. T. L.

DA SILVA (Pedro Dias). **Novo signal de verminose.** [A New Sign of Helminthiasis.]—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. May. Vol. 4. Ser. 2. No. 3. p. 60.

The author finds that in cases of verminous infection, especially with ascarids, and to a less extent with oxyuris, trichocephalus and taenia, the fungiform papillae of the tongue are red and prominent, especially at the edges and point of the organ, the condition disappearing with the expulsion of the worms. In ankylostome infection the tongue is large, pale, and indented, except when other helminths are present, when the fungiform papillae are prominent. He believes the sign to be of value in diagnosis especially in ascariasis.

A. G. B.

CORT (William W.). **Prenatal Infestation with Parasitic Worms.**—*Jl. Amer. Med. Assoc.* 1921. Jan. 15. Vol. 76. No. 3. pp. 170–171.

There are few records of prenatal infestation with parasitic worms and these the author has briefly summarized. FUJINAMI and NAKAMURA have reported *S. japonicum* from a foetus of a bitch which was suffering from schistosomiasis and NARABAYASHI caused the foetuses of pregnant bitches to become infected experimentally. The eggs of *S. japonicum* were found in the faeces of three out of 22 newborn babies in an endemic area. HOWARD reports an undoubted case of prenatal infestation with hookworm in a negro child in British Guiana: eggs were found in the child's faeces 14 days after birth. Other possibilities of future discoveries are discussed.

R. T. L.

CHASSOT. **Vers et appendicite.**—*Rev. Méd. Suisse Romande.* 1920 July. Vol. 40. No. 7. pp. 449–453.

The author was called to see a patient with all the symptoms of a typical appendicitis. On opening the peritoneal cavity the appendix was seen to be normal, except for intense hyperaemia of its serous coat. The appendicectomy was successful and the cure complete. The appendix was found to contain faecal matter and nine oxyuris but without signs of appendicitis. This case led the author to consider from the statistics on the subject, the question of distinguishing between a true appendicitis and an appendix invaded by worms. Of 100 normal appendices taken from dead bodies the author found that 10 contained parasites or their eggs, and of 100 removed by

operation he found 41 containing parasites or eggs; but out of these 41 there were only six that showed obvious pathological changes. The others were therefore not acute cases; on the contrary when acute inflammation existed parasites were rarely, if ever, found. The author therefore concludes that parasites do not cause appendicitis, but produce a condition simulating inflammation.

M. RIFF has arrived at the opposite conclusion. In 152 extirpated appendices he found 30 per cent. contained oxyuris, and in appendices extirpated from children under 15 years he found oxyuris in 75 per cent. of cases; he concludes that oxyuris are the first cause of appendicitis in the majority of cases; in addition 75 per cent. of autopsies made in Europe show the remains of former lesions of appendicitis. As there is no sure method of getting rid of oxyuris he concludes that it is better to operate than to wait, thus relieving or obviating an appendicitis, and depriving the oxyuris of a nest in the appendix. The author concludes that until more information is available it is better not to operate unless the symptoms are severe.

R. T. L.

LÉO (G.). **Helminthiase et dysménorrhée douloureuse.**—*Bull. Acad. Méd.* 1921. Mar. 8. Vol. 85. No. 10. pp. 319–321.

Helminth infections and particularly those due to oxyuris and ascaris can induce painful dysmenorrhoea. COUILLAUD'S sign is a very reliable indication of helminth infection. This consists of hypertrophy of the fungiform papillae of the tongue, which are visible to the naked eye as small red points at the tip and along the margin. A female patient with COUILLAUD'S sign associated with painful dysmenorrhoea should be treated with a vermifuge.

R. T. L.

FAIRLEY (N. Hamilton). **Observations and Reflections on the Toxicity, the Immunity Response and the Treatment of Certain Helminthic Infestations.**—*Med. Jl. Australia.* 1921. Mar. 12. 8th year. Vol. 1. No. 11. pp. 205–211.

After summarizing the causes underlying the pathogenicity of Helminths, the author reviews briefly the serological reactions, of which the precipitin test has limited application to taenia infestations. The complement-fixation reaction depends for success on the production of a suitable antigen. In hydatid the pure unadulterated fluid from the cysts constitutes the best antigen and its antigenetic property is largely dependent upon the scolex content of the cyst. Alcoholic extracts are inferior and give pseudopositive reactions with syphilitic sera. In hydatid disease in man an immune body may be detected in the blood serum and in peritoneal or pleural exudates. The cerebro-spinal fluid is negative unless the cyst is situated within the pia-arachnoid. From the surgical point of view this reaction is of the greatest importance as a means of determining whether a patient is rid of all cysts or not. The test as applied to bilharziasis has been used by the author latterly to control the effects of tartar emetic in treatment. In 39 out of 54 cases of less than two years' duration the reaction was positive, so in 31 out of 46 cases of more than two years' duration. Where an alcoholic extract was used 88 per cent. of 36 bilharzia cases of under two

years and 74·2 per cent. of 97 chronic cases were positive. In discussing anaphylaxis the author states that there can be little doubt that the phenomena resulting from the rupture of a hydatid cyst or its leakage after puncture are anaphylactic in nature.

R. T. L.

ROUILLARD (J.). **Les toxines vermineuses.**—*Presse Méd.* 1921 Apr. 9. No. 29. pp. 285–287.

This is a summary of recent work on the effects of helminth parasites. From a consideration of the arguments in favour of their toxic origin the author concludes that the products of the excretions or secretions of the parasite, like the aqueous or alcoholic extracts, act on the animal organisms like foreign proteins. There is protein shock with the primary injection and tachyphylaxis as in the case of peptones or organic extracts. Moreover one must admit the toxic character of these albuminoid substances, for they have the property of inducing special anaemias, cachexias, and eosinophilia and their injection results in circulatory and respiratory disturbances and a highly characteristic diarrhoea.

R. T. L.

JOURNAL OF PARASITOLOGY. 1921. June. Vol. 7. No. 4. pp. 186–201. With 3 text figs. **Proceedings of the Helminthological Society of Washington. (45th to 50th Meeting).** [HALL (Maurice C.) Secretary.]

Dr. CORT states that a new species of fluke parasitic in man was described in Japanese literature by ONJI and NISHIO, 1915, under the name of *Heterophyes nocens*. This fluke was stated to occur in two villages and to infest from 22 to 30 per cent. of their inhabitants. The final larval stage occurs in a fish, *Mugil japonicus*, which is customarily eaten raw. The parasite is very similar to *Heterophyes heterophyes* but is smaller, measuring 0·9 to 1·1 mm. in length. There are about 60 rodlets around the genital sucker. The encysted larvae when fed to dogs become mature and produce eggs in 7 to 8 days.

Dr. BARTSCH states that the correct name of the carrier of *Schistosomum japonicum* is *Blandfordia japonica* (Adams, 1861). Dr. CORT drew attention to TANABE's report of *Echinostoma perfoliatum* var. *japonicum* from man.

A third case of *Gongylonema hominis*, species inquierenda, was reported by STILES.

R. T. L.

GIRARD. **La bilharziose américaine à Madagascar.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. Dec. Vol. 18. pp. 62–75.

Vesical bilharziasis would appear to be absent from Madagascar, but the author has seen, since 1916, 26 cases of intestinal bilharziasis due to *S. mansoni*. The intestinal infections fall into several clinical types; the most common is a dysenteric diarrhoea similar to amoebic dysentery, developing no fever and accompanied at times by intestinal haemorrhage. In other cases the occurrence of traces of mucus or of blood in the stool leads to a microscopical examination, or there may be hepatic cirrhosis, the bilharzial nature of which is also revealed by an examination of the stool. The eggs are infrequent and it is often

necessary to examine several preparations at intervals for several days to find them. The author administers methylene blue in doses of 30 cgm. daily, in three cachets, for ten days. After an interval of five days the treatment is resumed and maintained until the eggs disappear from the stool. The author also recommends a trial of tartar emetic.

R. T. L.

LEGER (Marcel) & PRINGAULT (Ernest). **Helminthiase intestinale et bilharziose à** *Schistosomum mansoni* **à Madagascar.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 247–253.

The authors have taken advantage of an opportunity afforded them of examining at Marseilles the stools of 150 soldiers belonging to a battalion of "Tirailleurs malgaches" from various provinces of Madagascar. They were young and recently recruited; 76 per cent. were infested with intestinal entozoa, 56 per cent. with ascaris, 33·33 per cent. with hookworm and 30 per cent. with whip-worm. Neither eggs of oxyuris nor embryos of strongyloides were seen. Both the Necator and Ancylostoma species were present but *Necator americanus* was the more frequent. Fourteen out of the 150 soldiers were carriers of *S. mansoni*. The authors conclude with a discussion of the risks of introduction of *S. mansoni* and *Necator americanus* into France.

R. T. L.

MORIN (G. H.). **Sur la présence d'oeufs de** *Schistosomum mansoni* **à Madagascar, dans les selles d'individus sains cliniquement.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 229–231. (Discussion p. 231).

A study of fresh dejecta from 394 healthy persons on the south-east coast of Madagascar (Farafangana) showed that all but three, *i.e.*, 99·24 per cent., were infested with entozoa. Ascaris occurred in 71 per cent., trichocephalus in 65 per cent., ankylostomes in 32 per cent., bilharzia in 12·9 per cent., larvae of strongyloides frequently and in one case *Taenia saginata*. All the specimens of hookworm were *A. duodenale*. Necator was absent. The eggs of bilharzia belonged to *S. mansoni*. The endemic area of bilharzia infection is limited to the low country but is widely diffused along the eastern coast of Madagascar.

R. T. L.

RISQUEZ (J. R.). **Note sur la distomatose et la bilharziose humaines au Venezuela.**—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 382–385.

A species of Fasciola has been recorded in man in Venezuela about a dozen times, identified from the eggs found in the stools as *F. hepatica*. Cases of Bilharzia have been frequently met with; the parasite is *Schistosoma mansoni*, whose intermediate host is *Planorbis guadalupensis*. Examination of a large number of cases has shown the general occurrence of enlargement of the liver, ulceration of the rectum, eggs in the appendix, lungs, lymphatic glands, especially the mesenteric glands. At Caracas, the co-existence of bilharzia with pulmonary tuberculosis has been noted. Five main clinical types have been

distinguished:—(1) hepatic, (2) dysenteric, (3) dyspeptic, which often precedes the first two, (4) febrile, characterized by fever of long duration, (5) appendicular. Measures are being taken to prevent pollution of the water and the breeding of the intermediate host.

R. T. L.

RISQUEZ (Jesús Rafael). **Contribución al estudio de la anatomia patológica de la bilharziosis hepática en Venezuela.** *An. de la Direccion de Sanidad Nac.* Caracas. 1919. July–Sept. Vol. 1. No. 3. pp. 257–259. With 1 text fig. [English translation, pp. 267–269.]

From 1915 to 1918 the author has had occasion to study in the Caracas Medical School the condition of the liver in 42 cases of infection by *S. mansoni*. In the present brief communication he summarizes the conclusions previously published in various monographs. Besides the cirrhotic lesion arising in the liver, all degrees of fatty degeneration may be observed. In no case has the author ever observed the classical lesions of the cirrhosis of Laennec.

R. T. L.

MIYAGAWA (Yonejiro) & TAKEMORI (Sakaye). **The Mode of Infection of *Schistosoma japonicum* and the Principal Route of its Journey from the Skin to the Portal Vein in the Host.**—*Jl. Path. & Bact.* 1921. April. Vol. 24. No. 2. pp. 168–174.

The authors differ from NAKABAYASHI in his views upon the further migration of young bilharzia worms from the lung, where they have been carried by the blood stream. They believe from their series of experiments that the young worms penetrate actively into the skin, principally into the lymphatic spaces, then for the most part they invade the blood capillaries or the small peripheral veins, later gathering in the right side of the heart whence they pass to the lungs. They are arrested there for a short time owing to the disproportion in size of the worms and alveolar capillaries. Finally they reach the left side of the heart and are carried through the aorta to the wall of the gastro-intestinal canal, after passing through which they reach their permanent residence in the portal branches of the liver via the mesenteric vessels. Some of the worms in the systemic circulation reach the liver directly by the arteria hepatica.

R. T. L.

SANDERS (A. A.) & PRESTON (J. L.). **Schistosomiasis in the Yangtse Valley.**—*Jl. Roy. Nav. Med. Serv.* 1921. July. Vol. 7. No. 3. pp. 187–199. With 4 charts and 4 text figs.

Seven cases of Schistosomiasis (*S. japonicum*) occurred on board H.M.S. "Hawkins" as a result of a trip from Hankow to Shanghai in October, 1920. At Tatung, Kinkiang, Wuhu and Nanking officers landed for snipe shooting and waded in the marshes, especially near Tatung and Nanking. The incubation period for each case is given and in none was this more than 42 days. "The disease begins with an attack of fever with temperature between 100°–103° F., the face is flushed and there may be conjunctivitis and congestion of the fauces. The onset is usually gradual and as the disease develops there is a little dry cough and usually some abdominal discomfort with distension,

flatulence and furred tongue." After a few days in bed the patient feels better and the temperature falls, but he is then much troubled with severe general urticaria which comes and goes. The eyelids, lips, fingers and even palms of the hands may be affected and it may come on at intervals during the first two months. When the temperature has fallen the patient gets up and about, but still feels far from well; the lassitude is out of all proportion to the febrile attack and he may have some diarrhoea. He may relapse with peasoup stools and signs of enteritis. There is a high degree of eosinophilia, reaching in some cases 65 per cent. The ova of the parasite may now be found in the faeces. In this series no blood has been detected in the discharges. Three of the eight cases completely recovered within two months of onset. No skin irritation at the time of immersion is recorded in these cases. Improvement is reported from the treatment of some of the cases with antimony intravenously, but the author says that it is impossible to draw any conclusions at present. A careful series of clinical records accompanies the general part of the paper.

R. T. L.

CHRISTOPHERSON (J. B.). **Bilharzia Disease in Egypt.**—*Brit. Med. Jl.* 1921. April 2. pp. 491–492.

The outstanding facts in the article by Drs. LASBREY and COLEMAN on 1,000 cases of bilharzia treated by antimony [see above] seem to the author to be :—

(1) The prevalence of the disease in and around Cairo; (2) the applicability of the treatment both in complicated and uncomplicated cases, on a large scale in Egypt; (3) the prestige of British doctors with the fellaheen at the present period of national unrest is proof against the prejudice aroused by religious and political mischief makers. The conclusion to which the author arrives is, that in order to eliminate the scourge it might be dealt with systematically on a much larger scale and steps might now be taken to get rid of it by supplementing the present stationary hospital arrangements—(*a*) by working through the country with mobile hospitals with attached laboratory; (*b*) by adopting measures for the destruction of molluscs and for preventing those which cannot be destroyed becoming infected; (*c*) by education of the fellaheen in the causes, prevention and cure of the disease.

R. T. L.

MCWHAE (D. M.) & JAGGER (T. R.). **Bilharziosis in Western Australia.** —*Med. Jl. Australia.* 1921. Sept. 17. 8th year. Vol. 2. No. 12. pp. 217–219.

Following upon instructions from the Defence Department that all patients suffering from bilharziasis in Western Australia were to be collected in the Base Hospital, 11 patients have undergone treatment. All had been infected during 1916 in Egypt by bathing or washing in the freshwater canal at Serapeum or Tel-el-Kebir. Only one patient noticed the initial symptom of itching or burning after bathing. In five of the patients, urticaria, headache, general swelling, weakness, and influenzal symptoms occurred in from three weeks to three months. Haematuria developed in 10 patients, and was first noticed from one to six months after supposed date of infection. In one patient the infection appeared to be limited to the rectum; attacks of "dysentery"

occurred every six weeks with bright red blood in the faeces. In three of the patients there were both rectal and vesical lesions. One has frequent attacks of renal colic. Miscellaneous symptoms, though slight in character, were common—chiefly lumbar and abdominal pain, pain along the urethra during micturition, precordial pain, palpitation, faintness and malaise. The patients were treated by intravenous injections of tartar emetic and received from 1·38 to 1·86 gm. This course proved insufficient to cure, and it is proposed to give a second course.

R. T. L.

DIACONO (B.) & MOREAU (R.). **Note sur un cas ectopique de bilharziose en Tunisie.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Dec. Vol. 1. No. 4. pp. 437–439.

The paper describes a case of bilharziasis in Tunis which originated in Kairouan. Examination of the urine showed the presence of eggs of *S. haematobium.* Hitherto all the cases recorded in Tunis have acquired their infection in Southern Tunis.

R. T. L.

NICOLLE (Charles) & GOBERT (E.). **Sur la présence de mollusques de l'espèce** *Bullinus brocchii* **dans l'oasis de Gafsa, foyer de bilharziose vésicale.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 231–232.

Southern Tunis presents several centres of bilharziasis, the most important being Gafsa and its surroundings, Kebili and Nefzaoua and Djerid. Vesical bilharziasis is extremely common, while intestinal bilharziasis has only been observed three times, viz., at Degache, Kebili and Matmata. Investigations at Gafsa in April, 1921, showed the occurrence of *Bullinus brocchii* in the mud raised during the cleaning of the *mnaga* (stagnant extensions of an oasis watercourse) a short time before; the sole living specimen examined did not yield cercariae. The *mnaga* harbouring *Bullinus* are situated on the route from Gafsa village to the station. Children bathing in them quickly develop areas of irritation, which they scratch exceedingly. Observations made up to the end of June showed only the presence of empty shells; this species of snail is therefore a seasonal one.

R. T. L.

CAWSTON (F. G.).

i. *Schistosoma mansoni* **in South Africa.**—*Lancet.* 1921. Aug. 13. p. 332.

ii. **Introduction of** *Schistosoma mansoni* **Infection to South Africa.**—*Med. Jl. S. Africa.*—1921. June. Vol. 16. No. 11. pp. 209–210.

iii. **Schistosomiasis in Natal.**—*S. African Med. Rec.* 1921. Aug. 13. Vol. 19. No. 15. pp. 287–288.

iv. **Three Schistosomes in Natal which possibly attack Man.**—*Jl. Trop. Med. & Hyg.* 1921. Sept. 15. Vol. 24. No. 18. pp. 242–244. With 2 text figs.

v. **Experimental Infestation of Fresh-Water Snails.**—Reprinted from the *Trans. Roy. Soc. S. Africa.* 1921. Vol. 9. Pt. 4. pp. 301–303.

i. ii. iii. A boy who had suffered from constant haematuria of 18 months' duration, since bathing in pools at Sydenham, in Natal,

was found to have both lateral and terminal spined eggs in the centrifuged urine. In these pools *Physopsis africana* had been found heavily infected with schistosome cercariae. The complement fixation test for bilharzia made by Dr. MURRAY gave a weakly positive reaction. There was an eosinophilia of 20 per cent. In another case, that of a child eight years of age, the haematuria was due in the main to *S. haematobium*, but a few eggs of *S. bovis* were also found; and in iv., illustrations are given of these eggs, which measured 0·2275 to 0·1925 mm. in length.

v. Repeated attempts to infest *Limnaea natalensis* with miracidia from *S. haematobium* have uniformly proved negative. In *Physopsis africana* bred from eggs mature cercariae were found six weeks after experimental infection with miracidia of *S. haematobium*. On experimental grounds the author states that *Physopsis africana* when only four months old is capable of harbouring the bilharzia parasite. He has demonstrated bilharzia infection in 30 laboratory-bred specimens of Physopsis four to six weeks after exposure to miracidia.

R. T. L.

CAWSTON (F. G.). **Bilharziasis, its Cause, Complications and Cure.**—*S. African Med. Rec.* 1921. Mar. 26. Vol. 19. No. 6. pp. 113–115.

Physopsis africana, a carrier of *Schistosoma haematobium*, has been found by the author in the Schoonspruit at Klerksdorp, also at Magaliesberg, Mulder's Drift, Scheerport and Rustenberg in the Transvaal; at Avoca, Pinetown, Sarnia, Sea View, Bellair, Sydenham, Palmiet, Mayville, Umgeni, Ottawa, Umbilo, Umlaas Bridge and Maritzburg in Natal. Among the complications of bilharzia infection the author notes that epileptiform fits and nervous twitchings undergo decided improvement in boys who have been cured by antimony treatment. Renal colic is a frequent complication. The frequency of appendicitis of bilharzial origin is commented upon. Dr. W. A. MURRAY has recently shown that the antigen prepared at Durban gives a positive reaction even in patients from the Far East who harbour *Schistosoma japonicum*.

R. T. L.

CAWSTON (F. G.).

i. **The Control of Bilharzia: Destruction of Molluscs.** [Correspondence.]—*Brit. Med. Jl.* 1921. Mar. 26. p. 479.

ii. **Wild Birds a Cause of the Spread of Bilharzia Infection.**—*Jl. Trop. Med. & Hyg.* 1921. Apr. 15. Vol. 24. No. 8. pp. 109–110.

iii. **Some Infections due to Fresh-Water Snails and their Eradication.**—*S. African Med. Rec.* 1921. Apr. 9. Vol. 19. No. 7. pp. 125–126.

i. ii. Many wild birds seen along the banks of rivers, particularly among the reeds, "carry in the mud attached to their claws numerous minute snails and the eggs of snails which have become attached to their claws whilst they are drinking water from the river." They therefore assist in the spread of bilharzia disease and should not be protected. Domesticated ducks and "millions" fishes can be safely recommended to keep down the infection.

iii. In this paper the author covers old ground.

R. T. L.

CAWSTON (F. G.). **Some South African Cercariae.**—Reprinted from *S. African Jl. Natural History.* 1921. June. Vol. 3. No. 1. pp. 199–204. With 1 plate.

Twenty distinct species of cercariae have been detected during the last two years in 5,000 freshwater snails collected from rivers along the East Coast of South Africa. Cercariae closely resembling "the Bilharzia" have been obtained from *Physopsis africana* (in nearly 30 per cent.), *Isidora tropica* (once), *Planorbis pfeifferi* (once), *Limnaea natalensis* (five specimens contained rediae with cercariae closely resembling the Bilharzia). The cercariae from *P. africana* give rise to numerous *S. haematobium* and *S. bovis* in guinea-pigs. Strong solutions of salt, fresh lime and tartar emetic have been shown to destroy the free-swimming cercariae.

R. T. L.

PORTER (Annie). **The Invertebrate (Molluscan) Hosts of** *Schistosoma mansoni* **and** *Fasciola hepatica* **in South Africa.**—*Med. Jl. S. Africa.* 1920. Nov. Vol. 16. No. 4. pp. 75–76.

The cercariae of *S. mansoni* have been found twice in 1,050 specimens of *Physopsis africana* and in *Planorbis pfeifferi*, both obtained from pools in the Indian village of Mayville near Durban. The infection with *S. mansoni* in Natal appears to be relatively infrequent, as cases are rarely encountered. The South African molluscan hosts of *fasciola hepatica* have been determined, viz., *Isidora tropica* and *Limnaea natalensis*. [*Physopsis africana* at Durban has now been implicated in the spread of *S. haematobium*, *S. mansoni* and *S. bovis*.]

R. T. L.

CLAPIER (P. N.) **Contribution à l'étude de la répartition des Bilharzioses en Afrique équatoriale française.**—*Bull. Soc. Path. Exot.* 1920. Dec. 8. Vol. 13. No. 10. pp. 804–809.

French Equatorial Africa is surrounded by countries in which bilharziasis is common. In the equatorial zone itself there occur species of *Planorbis* and *Lymnaea*, *Melania tuberculata* and *Physa forskali*, which are known to be trematode intermediaries. In spite of these facts, observations made in the region of the Middle Congo have shown that infection is very rare, three cases only of vesical and one of intestinal bilharziasis being recorded from the entire Oubangui district and the Congo. Irébou was found to be a centre of infection, yielding five cases of intestinal bilharziasis due to *S. haematobium*. The scarcity of cases of parasitism is attributed to the possible limitation of the intermediate hosts to certain areas, to the extreme dilution of cercariae in the great rivers of this region, and to the fact that cases which form the sources of infection, coming from the Sudan and Nile valley, are not sufficiently numerous to contaminate these countries.

R. T. L.

i. BETTENCOURT (A.), BORGES (I.) & DE SEABRA (A.). **La bilharziose vésicale en tant que maladie autochtone au Portugal.**—*C. R. Soc. Biol.* 1921. Oct. 29. Vol. 85. No. 30. pp. 785–786.

ii. ——, —— & ——. **L'hôte intermédiaire du** *Schistosomum haematobium* **au Portugal.**—*Ibid.* Dec. 17. No. 37. pp. 1169–1170.

(i) An endemic focus for *S. haematobium* has been discovered at Santa Luzia near Tavira, in the province of Algarve, Portugal. Bifid-tailed cercariae were found in two specimens of *Planorbis corneus*, Linn.

var. *metigensis*, Forbes, closely resembling those of *S. haematobium*. The infected molluscs were collected from a place in Atalaija where women wash clothes and where infected persons bathe and even urinate. Conditions were unfavourable for the investigation and it was not possible to establish the connection with a specific intermediary beyond doubt.

(ii) Continuing their researches on the intermediate host of *S. haematobium* in Portugal, the authors have obtained cercariae emerging spontaneously or by dissection from *Planorbis corneus* var. *metidjensis*, Forbes, identical with those of *S. haematobium*, thus confirming previous suspicions that this mollusc acts as an intermediate host. Positive results were obtained in attempts to infect with these cercariae Planorbis taken from districts other than those in which schistosomiasis had occurred. Experiments with Physa gave negative results. Both *P. corneus* var. *metidjensis* and *Physa acuta* occur at Saint Luzia and Tavira, where the disease has been reported.

R. T. L.

MORIN (G. H.). **Sur un procédé technique de recherche des oeufs de** *Schistosomum mansoni*.—*Bull Soc. Path. Exot.* 1921. June 8. Vol. 14. No. 6. pp. 328–331.

The following method is recommended as best for the finding of eggs of *Schistosomum mansoni*, but is inferior to Carles' method for Trichocephalus and Ankylostome eggs.

(1) Dilute a fixed amount of material (15–25 cc.) in serum containing 10 per cent. of formol to make a homogeneous emulsion.

(2) Filter once through metal gauze, and a second time through wide-meshed silk (Carles' filter—32 meshes per cm.).

(3) Catch the filtrate in a conical vessel and allow it to settle for about 15 minutes. With a fine pipette take up five drops from the bottom from five different points and make five preparations.

R. T. L.

SHAW (C. Gordon). **Cystoscopic Appearances in Bilharziosis.**—*Med. Jl. Australia.* 1921. Jan. 29. 8th Year. Vol. 1, No. 5. pp. 85–86.

The author has studied the cystoscopic appearance in 23 cases of bilharziasis undergoing treatment with tartar emetic. In 11 cases in which there were active nodules before treatment these completely disappeared or were replaced by inactive atrophic granules. In two cases in which this was the main lesion the bladder was restored practically to normal. This change occurred at the same time as the disappearance of active ova from the urine. The polypi diminished appreciably in size, and in five cases completely disappeared. The infiltration diminished and signs of local subacute cystitis subsided. A most surprising improvement took place in the extensive areas which had undergone fibrosis and atrophy of the mucosa with more or less complete obliteration of vessels. These areas in many cases lost their dull, dead, white appearances and became pink. Not so marked an improvement occurred in the granulation tissue but the yellow nodules, the infiltrations and polypi did respond to a very striking extent.

R. T. L.

CROSS (K. Stuart). **Radiological Note [Bilharziasis].**—*Med. Jl. Australia.* 1921. Jan. 29. 8th Year. Vol. 1. No. 5. p. 85.

A series of 21 cases of bilharziasis were examined radiographically in collaboration with Drs. SUMMONS and IRVING (*q.v.*). Eleven patients had lung symptoms—usually a chronic cough. All of these showed a generalized thickening and extension towards the periphery of the finer branches of the broncho-vascular tree, representing a generalized bronchitis. Several also showed focal involvement: (*a*) as groups of soft, discrete, spherical nodules of more or less uniform diameter of about 1 mm. usually situated in the lower lobes, and (*b*) as scattered, small, spherical or irregular linear or hook-shaped calcified foci, situated mainly in the upper lobes.

R. T. L.

POMARET & ANDRÉANI-CONSTANTINI. **Sur un cas de bilharziose vésicale mixte.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 567–568.

The authors cite an instance of the presence of eggs of *S. haematobium* and *S. mansoni* in the urine of a case of vesical bilharziasis in French West Africa. In a note at the end of the paper M. BRUMPT states that the faeces of the case also yielded eggs of both the above species.

R. T. L.

DES LIGNERIS (M. J. A.). **A Case of Schistosomiasis of the Female Pelvic Genitalia with Subsequent Tubal Pregnancy and Abortion.**—*Med. Jl. S. Africa.* 1921. Oct. Vol. 17. No. 3. pp. 46–48. With 2 text figs.

This case illustrates the localization of bilharziasis within the female genital organs, with resulting dysmenorrhea, oligomenorrhea, comparative sterility and tubal pregnancy with subacute symptoms of tubal abortion. The patient was an Indian woman coming from Madras. Examination showed that the ovary was the seat of bilharziasis. Macroscopically, part of the ovary appeared to consist of firm, scar-like, whitish tissue, which upon sectioning showed the typical granulation and cicatricial tissue of schistosomiasis. Masses of miliary tubercle-like formations, "endothelial leucocytes" and giant cells of Langhans type were adherent to 1–4 eggs of *S. haematobium*. The case is of interest in showing that bilharziasis may occur without manifest clinical signs in bladder or intestine.

R. T. L.

ANNANDALE (N.) **The Geographical Distribution of the Freshwater Gastropod Molluscs of the Indian Empire and its Direct Bearing on that of Human Disease.**—*Indian Jl. Med. Res.* (Special Indian Science Congress Number, 1920.) pp. 35–37.

In the Indian Empire most of the hill stations are practically safe from Trematode infection owing to the absence, or practical absence, of aquatic molluscs, while the whole of the plains of India proper are open to danger of infection, especially where bodies of still water containing abundant vegetation are present. There is very little danger from rapid-running water or from wells, and comparatively little from rice-fields owing to the limited period for which they are flooded.

The geographical range of species in the plains is extremely uniform. The number of common essentially tropical genera is small, and that of endemic genera still smaller. Bithynia and allied forms, Vivipara, Limnaea and Gyraulus [Planorbid] for the most part predominate.

R. T. L.

CHANDLER (A. C.). **Control of Fluke Diseases by Destruction of the Intermediate Host.**—*Jl. Agric. Res.* 1920. Nov. 1. Vol. 20. pp. 193–208.

This paper records the results of an attempt to find a cheap chemical substance, readily soluble in water, which would be destructive to snails in relatively weak solutions and would not render water either injurious or unpalatable for man or domesticated animals. A large series of chemicals were tested and it was found that copper salts have an extremely toxic effect on snails even in such great dilutions as one in a million of water. Mercury bichloride is the only other salt which was found to approach the salts of copper in toxicity, but it is not so effective, is more expensive and is more toxic to higher animals. Of the copper salts, copper sulphate is the cheapest. Snails of eight species belonging to six genera were used and were found to be similar in their susceptibility. All the species die within 48 hours in solutions of 1 in 500,000 and 1 in 1,000,000. Limnaea, Physa and Planorbis die within 48 hours in solutions of 1 in $1\frac{1}{2}$ millions to 1 in 2 millions. All specimens revived after 48 hours immersion in a 1 in 10 million solution, although they became prostrate while in it. Basic sulphates or carbonates in alkaline solutions precipitate copper sulphate, as does also organic matter in solution. Algae absorb the salts of copper. It is believed that by this method Trematode diseases could be successfully brought under control.

R. T. L.

VEGAS (Martin.) **Algunos ensayos del tratamiento de la bilharziosis Mansoni por el emético.** [Some Trials of the Tartar Emetic Treatment of Intestinal Bilharziasis.]—*Gac. Med. de Caracas.* 1920. Mar. 31. Vol. 27. No. 6. pp. 69–74.

The paper consists in the main of clinical histories of eight cases—one that of the author himself—of *Schistosomum mansoni* infection treated by intravenous injections of tartar emetic. Treatment commenced with an injection of $2\frac{1}{2}$ cgm. The dose was raised by increments of that amount until a maximum of $12\frac{1}{2}$ cgm. was reached, each dose being given twice before increasing. The largest total dose given in any case was 75 cgm., and in this case eggs had disappeared from the faeces after 50 cgm. had been injected. In the earlier of his cases the author injected on alternate days, but in all his later cases, daily.

Our results accord, in the main, with those of the English doctors in Egypt. There are, however, some slight differences. The total dose employed by us, for instance, up to the disappearance of eggs, was uniformly less than that recorded by them, our largest total dose being 75 cgm. This meant a relatively shortened treatment. Further, in the majority of our cases 50 cgm. brought about the disappearance of eggs. The difference is perhaps explainable in this way. Most of the Egyptian observations relate to vesical bilharziasis and the *Schistosomum mansoni* is, perhaps, more susceptible to the action of tartar emetic than *S. haematobium*.

F. S. Arnold.

CHRISTOPHERSON (J. B.). **Demonstration of the Technique of the Intravenous Injection of Antimony Tartrate in Bilharzia Disease.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.). 1921. June. Vol. 14. No. 8. pp. 18–21.

The technique recounted in this paper has already been summarized on previous occasions in this *Bulletin*. The two patients, on whom this was demonstrated, had contracted bilharziasis many years ago. One case was of 18½ years standing, the other 21 years. The author states that :—"In the average case of bilharzia where there is not much damage to the bladder wall, the urine will become quite clear and normal, to ordinary clinical tests, after 20 gr." To all intents and purposes he is cured after 25 gr. He will continue, however, to pass granular ova periodically in small numbers at intervals for two years or longer. In severe infections and in long standing cases where there are secondary organic changes in the bladder the urine will remain cloudy and occasionally clots may be found for some time after the injections have ceased. This is due to the granulations or papillomata on the bladder wall, which bleed; the blood clots or shreds of papillomata contain ova. This does not mean that the patient is not cured, but that nature is busy rectifying the secondary organic changes.

Relapses after 25 gr. of antimony tartrate are uncommon, but occur, and it would appear that some broods of bilharzia worms are more resistant than others. Neither colloidal antimony nor stibynal has come up to expectations as a substitute for tartar emetic.

R. T. L.

LASBREY (F. O.) & COLEMAN (R. B.). **Notes on One Thousand Cases of Bilharziasis Treated by Antimony Tartrate.**—*Brit. Med. Jl.* 1921. Feb. 26. pp. 299–301.

Since June, 1919, CHRISTOPHERSON's treatment has been used as a routine for both urinary and rectal bilharziasis at the Church Missionary Society's Hospital, Old Cairo. One grain is given as the initial dose and is increased by ½ gr. at each injection to a maximum of 2·5 gr. on the fourth injection. Injections are given on consecutive days for the first six days and then on alternate days. Weak men and most women take slightly smaller doses. Children take much smaller doses in proportion to their size and condition. All cases in which there is much reaction, *e.g.*, fever, loss of appetite, etc., receive smaller doses, and some have longer intervals between the injections. The aim of the treatment is to secure a cumulative effect from about 20 gr. of the tartar emetic. In the total series of 1,000 cases there were 10 deaths, but many of the cases were physical wrecks. The usual symptoms preceding death are total loss of appetite, extreme debility and complete apathy. No death occurred immediately after an injection; the patient generally curls up in bed, lives perhaps for some days and dies from syncope following sudden effort, *e.g.*, rising from bed. In cases of marked intolerance treatment should be immediately abandoned. The very marked relief of the symptoms results in a certain proportion of the patients discontinuing treatment. Of 630 cases dealt with in 1920, 20·6 per cent. did not take as many as six doses. Of 500 who persevered, 70 per cent. were pronounced cured. It is noteworthy that "the successful surgical treatment of complications dependent on bilharziasis, such as urinary fistulae and rectal papillomata, is enormously facilitated by the elimination of the causative factor."

R. T. L.

SANDERS (A. A.) & PRISTON (J. L.). **Notes on Treatment of Some Cases of Schistosomiasis.**—*Jl. Roy. Nav. Med. Serv.* 1921. Oct. Vol. 7. No. 4. pp. 290–292.

The authors summarize the after history of some cases of schistosomiasis contracted in the Yangtse [see above, p. 200].

"(1) Three mild cases of clinically diagnosed schistosomiasis received symptomatic treatment only and recovered rapidly: all are in apparently good health six months after infection.

"(2) Three moderately severe cases in whom ova were found received 2¼ grm. of N.A.B. Live miracidia were hatched from two of these cases, in one case twelve weeks and in the other five weeks, after the last injection. The first of these is in apparently good health in spite of the presence of live ova. The other two were not much better after the course than before, and received further antimony treatment.

"(3) The above two cases and one other severe case each received from 21 to 24½ gr. of antimony tartrate intravenously. In each case the number of ova excreted was much diminished, and those found after the course all appeared to be dead.

"The severe case was strikingly improved in health and weight, and the other two are in good health but still below their original weight.

"(4) In all the cases, however treated, the eosinophilia has decreased fairly steadily throughout, and no particular kind of treatment seems to affect this decrease markedly."

R. T. L.

HARSANT (A. G.). **Bilharziasis amongst British Troops in Mesopotamia. Notes on the Treatment of Thirty-one Cases by Intravenous Injections of Tartar Emetic.**—*Jl. Roy. Army Med. Corps.* 1921. Nov. Vol. 37. No. 5. pp. 376–381.

Thirty-one cases of infection with *S. haematobium* occurred amongst the British garrison on the Euphrates during the winter of 1920–21, probably acquired around Kufa and Kifl in baths filled direct from the river. In 24 cases symptoms commenced in from 6 to 15 weeks after their arrival in the Kufa area, but three cases showed no symptoms until the 23rd week. The ova found both in vesical and rectal cases were terminal spined. The results of tartar emetic injections are tabulated. The author notes as complications the development of otorrhoea, conjunctivitis, blepharitis and herpes towards or after the termination of the course of treatment. The one case known to have relapsed had had a full course of 14 injections and a total of 32 gr. of antimony tartrate, and was discharged after several negative examinations of urine. In a concluding paragraph the author makes reference to other 122 cases in whose urine ova were subsequently found.

R. T. L.

CAWSTON (F. G.). **A Series of Cases of Bilharzia Disease treated with Tartar Emetic.**—*Jl. Trop. Med. & Hyg.* 1921. Oct. 15. Vol. 24. No. 20. pp. 267–268.

A chart is given showing the age of the patient, duration of disease, amount of tartar emetic given and the date upon which ova ceased to appear in the urine. The history of the 25 cases quoted shows that a total of 12 gr. of antimony tartrate given in doses thrice weekly extending over a month should suffice to effect a permanent cure.

R. T. L.

CAWSTON (F. G.). **The Treatment of Fluke Diseases.**—*Jl. Trop. Med. & Hyg.* 1921. Oct. 1. Vol. 24. No. 19. pp. 254–255.

The author has followed up a series of 100 cases of *S. haematobium* infection which have been treated with tartar emetic, and believes that if treatment is maintained for a complete month the patients are no longer capable of spreading the disease. An equal number of cases have been treated with ipecacuanha, and this would appear to be equally effective.

R. T. L.

BAUJEAN (R.). **Traitement des Bilharzioses intestinale et vésicale, par l'émétique en injections intraveineuses.**—*Bull. Soc. Path. Exot.* 1921. May 11. Vol. 14. No. 5. pp. 299–307.

Tartar emetic has been used successfully by the author in six cases of vesical bilharziasis and 12 cases of intestinal bilharziasis at the Colonial Hospital at Dakar. Instead of a solution of the salt in distilled water, which it was necessary to dilute at the time of injection, the author used a more concentrated solution made up of 0·02 gm. of tartar emetic for each cc. of physiological saline. Flasks of from 30 to 60 cc. according to requirements are prepared and are sterilized at 120° C. The solution is then used for intravenous injection. 1·5 cc. of this solution contains about ½ gr. of tartar emetic. Three of the 18 cases suffered from symptoms of general ill-health and treatment was abandoned. The good results were much more apparent in the vesical than in the intestinal cases, but in the latter it is necessary to note the gradual improvement in the clinical symptoms and in the character of the stool which corroborates the negative results of microscopical examinations In six out of twelve of the cases bilharziasis was the sole cause of trouble. In other cases, however, the syndrome of intestinal symptoms is partly due to associated parasites, *e.g.*, amoebae and ankylostomes. It is advisable to cure the patient by treatment with emetine and thymol prior to the course of antimony.

R. T. L.

HODSON (V. S.). **The Action of Tartar Emetic in Bilharziasis.** [Correspondence.]—*Lancet.* 1921. July 9. p. 97.

The author considers that the bilharzia worms and not the eggs are primarily affected in treatment by tartar emetic. He judges that the usual time taken for a crop of eggs to pass from the worm to the urine is from five to seven days, and this is the period within which improvement takes place after tartar emetic. Improvement similarly follows confinement to bed on a fluid diet, but there is a relapse in this event on return to a full diet.

R. T. L.

SUMMONS (Walter H.) & IRVING (Harold). **Observations on the Treatment of Egyptian Bilharziasis by Tartar Emetic.**—*Med. Jl. Australia.* 1921. Jan. 29. 8th Year. Vol. 1. No. 5. pp. 83–85.

The complete cure by tartar emetic of 30 cases of bilharziasis contracted in Egypt is recorded. In 26 of the patients microscopical examination demonstrated the presence of ova. In the remaining four the diagnosis was based on the history and present symptoms

confirmed by cystoscopic examination and the finding of a definite eosinophilia. Although only lateral spined eggs were found originally in some of the cases, terminal spined eggs appeared later in many. The symptoms usually complained of when the patient came for treatment were terminal haematuria, either continuous or intermittent, occasional diarrhoea with blood in the stool, and cough. The men were in many cases obviously anaemic and debilitated. Twice after treatment was commenced, while blood for films was being taken from the fingers of patients to make differential leucocytic counts, ova were found in the films, on occasion as many as six. There was a high eosinophile count, which was of value in confirming the diagnosis in those cases whose excreta did not contain ova at the time of admission to hospital.

R. T. L.

PAVY (Harold K.). **Intravenous Injections of Antimony Tartrate in the Treatment of Bilharziosis.**—*Med. Jl. Australia.* 1921. Aug. 27. 8th Year. Vol. 2. No. 9. pp. 155–162.

Ten cases of urinary bilharziasis have been treated during the past six months at No. 7. Australian General Hospital, Keswick. The results and various examinations were tabulated. The author describes the method adopted and the effects and results of treatment, giving the individual records of each case. The average dose of tartar emetic before the urine was negative was 0·72 gm. The average amount given was 1·62 gm. In all, the ova had disappeared or were dead by the end of the course. All the cases originated in Egypt.

R. T. L.

KHALIL (M.). **Observations on the Effect of Tartar Emetic on the Eggs and Miracidia of** *Bilharzia haematobia.*—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.). 1922. Feb. Vol. 15. No. 4. pp. 13–15. With 1 text fig.

The therapeutic action of tartar emetic in bilharzia disease is strikingly confirmed by various clinical observers but has not yet been explained in scientific terms. It has been claimed that antimony is lethal to the adult worms in the portal system and to the ova in the tissues and urine, and CHRISTOPHERSON has recorded certain *in vitro* experiments upon the eggs and miracidia in support of this claim. The validity of these experiments is questioned by Khalil, who shows that "tartar emetic as used in these experiments acts by virtue of its being a salt and not as the specific drug that kills the bilharzia worms and their eggs inside the body." The miracidia are not affected by tartar emetic in a dilution approximating to that used during treatment.

R. T. L.

RISQUEZ (Jesús Rafael). **Un accidente ocurrido durante el tratamiento con el emético.**—*Gac. Med. de Caracas.* 1920. Mar. 31. Vol. 27. No. 6. pp. 74–75.

An account of a case of bilharziasis in which, about half-way through a course of tartar emetic injections, the patient, a man, had a severe rigor shortly after an injection of 9 cgm., he having received 8 cgm. the previous day without ill effect. The patient's appearance was that of a man at the commencement of

a malarial attack. Severe pain round the waist and in the muscles of the thigh now came on, the temperature began to rise and in a few minutes reached 104° F. and the patient had two bilious vomits, pulse 132. The blood was examined, but no malarial parasites were found. The next morning the temperature was normal. For some days the patient complained of extreme debility and severe pain in the trapezius. Recovery was complete at the end of a week.

F. S. Arnold.

TSYKALAS. **Neue Wege in der Behandlung der Bilharziakrankheit in Aegypten.** [New (Emetine) Methods of Treatment of Bilharziasis in Egypt.]—*Wien. Klin. Woch.* 1921. Dec. 1. Vol. 34. No. 48. pp. 579–580.

The author advises the use of emetine in the treatment of bilharziasis. A total amount of 1·0–1·2 gm. emetin is injected intravenously during the course of 8–10 days (0·1–0·12 gm. per day). This method has usually no bad consequences, whereas if the same total amount is given in smaller doses (0·05–0·06 gm. per day) spread over 20 days, or 0·1–0·12 gm. given every other day, severe symptoms occur and death may even result. Emetine not only cures the haematuria but kills the eggs and embryos enclosed in the eggs. This treatment lasts in slight and average cases 8–10, in severe 12 days—in women and children 6–8 days. If symptoms of intoxication, such as diarrhoea and sickness, arise after eight days the treatment is stopped. Should the haematuria still continue it can be assumed that the bladder and kidneys are organically involved and must be treated locally. Out of 2,000 cases so treated with emetine 90 per cent. showed a complete and lasting cure.

R. T. L.

MAURIAC (Pierre) & BOYER (R.). **Recherches expérimentales sur le traitement de la distomatose par les injections intraveineuses d'émétique.**—*C. R. Soc. Biol.* 1921. Nov. 17. Vol. 85. No. 33. pp. 197–199.

Eggs of *Fasciola hepatica* having been found in the stools of a patient, the authors decided to treat the case with tartar emetic and to carry out parallel experiments on sheep at the same time. Four sheep were chosen whose stools contained eggs of *Fasciola hepatica*, *Dicrocoelium lanceatum* and a strongyle. The injections of tartar emetic were made intravenously in a solution of 4 per 100. Three animals received 86, 216 and 371 cgm. respectively without apparent injury to the flukes. The fourth was used as a control.

The patient received 10 successive injections of 1–9 cgm. with a total of 60 cgm. Toxic symptoms were shown after the dose of 7 cgm., and were serious with the dose of 9 cgm. At the end of the treatment eggs were still found, although for a day or two they appeared degenerate. A further series of injections were made three weeks later with similar results, eggs persisting in the stools up to the death of the patient in October.

These experiments all show the uselessness of intravenous injections of tartar emetic in the treatment of human and ovine distomiasis.

R. T. L.

SERVANTIE (Louis). **Recherche de la déviation du complément dans la distomatose humaine.**—*C. R. Soc. Biol.* 1921. Apr. 16. Vol. 84. No. 13. pp. 699–700.

In the fæces of a woman, 28 years old, the eggs of *Fasciola hepatica* were found. This is a very rare human parasite in France, and hitherto no one has arrived at a diagnosis by the application of the deviation of complement test. A single experiment only was attempted, sheep fluke antigens gave a positive result with syphilitic serum and with the patient's serum. Hydatid fluid gave a positive result with the patient's serum but not with the syphilitic serum. Very varying results ranging between complete haemolysis and total absence were obtained with human red cells and the serum of fluke infested sheep. A fuller account is promised of these observations when completed.

R. T. L.

JACKSON (Harold G.). **A Revision of the Genus** *Fasciola*. **With Particular Reference to** *F. gigantica* **(Cobbold) and** *F. nyanzi* **(Leiper).**—*Parasitology.* 1921. Mar. Vol. 13. No. 1. pp. 48–56. With 1 plate and 4 text figs.

The type of *F. gigantica* has been re-examined and the author considers that no important character separates *F. angusta* (Railliet) and *F. aegyptiaca*, Looss, from this species. In this he confirms generally accepted opinion.

R. T. L.

NAKAGAWA (Koan). **On the Life Cycle of** *Fasciolopsis buski*, **Lankester.**—*Kitasato Arch. Experim. Med.* 1921. Mar. Vol. 4. No. 2. pp. 159–167. With 1 plate.

Human cases of *Fasciolopsis buski* are unknown in Formosa but pigs are frequently infested. The eggs hatch in the summer in from two to three weeks. The miracidia under experimental conditions penetrate *Planorbis coenosus*, *Segmentina largillierti*, *Planorbis compressus* and *Limnaea pervia*. In the first two species the author has studied the development onwards to the cercariae. This follows closely the metamorphosis of *Fasciola hepatica*. The miracidia leave their ciliated coats as they penetrate the snail. In seven days after infection the rediae are found in the sporocysts and they migrate as far as the mantle or into the wall of the alimentary canal. On the ninth day the largest rediae measure 0·42 mm. by 0·17 mm. In ten days some of the rediae have reached the liver. In 14 days the largest rediae measure 0·5 mm. On the 35th day young cercariae develop and in a number of cases daughter rediae are also seen. Each redia contains about 4–7 cercariae. The fully grown cercariae measure 0·21–0·23 mm. in length and 0·12–0·15 mm. in breadth. The oral sucker has a diameter of 0·04 mm. The ventral sucker is 0·03 mm. in diameter. Soon after liberation the full-grown cercariae attach themselves to grass and encyst. The encysted cercaria is disk-shaped, 0·13–0·135 mm. in diameter. The excretory organ is filled with coarse granular substance characteristic of this species. Similar cercariae were found in April in the watersnails collected in a small pool in Ronnansho village, near Shinchiku (Formosa), where the pigs are abundantly infested. By feeding dogs and pigs with encysted cercariae the author succeeded in raising fully grown specimens of *Fasciolopsis buski*.

R. T. L.

[illegible] H. [illegible] **Experimental Ingestion of the Ova of *Fasciolopsis buski* and also the Ingestion of Adult *Fasciolopsis buski* for the Purpose of Artificial Infestation.**—[illegible] 1921. Sept. Vol. 8. No. 1. pp. 40–44. With 2 text figs.

In order to have some time basis for the dismissal of patients from [illegible] it was desirable to find out the time required for the stool [illegible] ova-free after treatment. The eggs and some living adults of *Fasciolopsis buski* were experimentally ingested by the author. The eggs which were washed and then swallowed in ordinary gelatine [illegible] had disappeared. From their appearance when voided they apparently [illegible] The eggs were found in the stool after the first ingestion of mature adults and it is possible that these were digested, as they had been swallowed on an empty stomach. A later attempt proved more successful and 28 hours after swallowing three live flukes, one of which lodged and became parasitic, ova appeared in the stool and did not disappear till a year later when expelled by an anthelmintic. The eggs obtained from this single fluke were [illegible]

R. T. L.

[illegible] A. F. [illegible] **Five Cases of Fasciolopsis Infection, with Remarks.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Feb. 18. Vol. 14. No. 6. pp. 93–96. Discussion pp. 96–98.

From studies of sections, longitudinal, transverse and horizontal, the author failed to observe any difference of moment between the so-called *F. buski, rathouisi* and *goldiardi* types. The clinical notes of the five cases suggest to the author the following conclusions :—

" 1 The parasites live in the stomach, duodenum and the first part of the small intestine only ; when found in the large bowel they are nearing the end of their existence.

" 2 Their ill effects are not in the direction of blood destruction, but are produced by toxic absorption, which leads to secondary anaemia, dyspnoea, general oedema, ascites, and skin changes. There is no fever directly caused by them.

" 3 No melaena has been noted, even in the massive infection case 729. Diarrhoea is common. Many of the patients state they have passed blood, but a freshly passed fluke in a mass of pultaceous faeces exactly simulates blood clot ; moreover, there is a Chinese proverb : 'Ten men, nine haemorrhoids ; Ten women, nine leucorrhoeas' ; which bears on the subject of melaena.

" 4 No cases were observed in infants or young children ; this may be connected with the fact that weaning is often delayed to the third and fourth year.

" 5 The disease may be fatal unless the parasites are expelled by art or by accident. I had one death (not here recorded) within twenty-four hours of admission for bowel troubles, in which the typical ova were [illegible] after death.

" 6 Rapid recovery follows when the parasites are evacuated, unless the patient is in the later stages of exhaustion.

" 7 Faecal examination and re-examination are the essentials for success, the fasciolopsis ova being characteristic. Certain observations were made on the relative sizes of ova *in utero* and in the faeces ; also in the analogous case of *Fasciola hepatica* infection in the pig of Shanghai [illegible]

R. T. L.

SWEET (W. C.). *Fasciolopsis buski* **Infestation.**—*Jl. Amer. Med. Assoc.* 1921. June 25. Vol. 76. No. 26. pp. 1819–1820.

The frequency of fasciolopsis infestation in the Shaohsing district is remarkable. In 732 first examinations of stools from hospital and dispensary patients in one year 71·5 per cent. were positive. A new series of cases is given. Of 1,143 patients seen between 31 December, 1918, and 1 January, 1921, 40·8 per cent. had fasciolopsis ova in their stools. In 52·4 per cent. of the patients no symptoms were referable to the parasites. In cases of long standing there is oedema of the face, hands, and feet, enlarged and pendulous abdomen, epigastric distress of an indeterminate type and loss of strength. Five of the patients vomited flukes; 58·7 per cent. gave an eosinophilia of over 8 per cent. The treatment given is Beta-naphthol, usually in a dose for adults of from 10 to 15 gr. in three parts, followed by salts. Two treatments are necessary in most cases. The largest number of flukes passed in the above series of cases was 1,104.

R. T. L.

ARCHIVES DE MÉDECINE ET PHARMACIE NAVALES. 1921. July–Aug. Vol. 111. No. 4. p. 324.—**Troubles déterminés par** *Fasciolopsis fülleborni.*

A case is briefly noted of a young student who had had chronic fever and persistent diarrhoea for some years. *Plasmodium vivax* was found in the blood and a course of quinine instituted, which only ameliorated the condition. The stools were found to be free from amoebae but to contain eggs of Fasciolopsis. The evacuation of a considerable number of flukes after the administration of thymol caused a disappearance of the fever and the diarrhoea.

R. T. L.

KOBAYASHI (S.). **On the Development of the** *Paragonimus westermanni* **and its Prevention.**—*Japan Med. World.* Tokyo. 1921. May 15. Vol. 1. No. 1. pp. 14–17.

Paragonimiasis is found in all parts of Korea. More than half of the population is affected where it is prevalent. There are many deaths, but in some cases patients are not aware of the infection and engage in the daily toils of healthy people. From experimental studies the author is led to believe that the early stages of the infection are the most harmful and are often considered as a simple pneumonia. The parasites occur in dogs, cats and other carnivora, and in Korea there are no distinguishing features between those infesting man and animals. The development of the egg is retarded by cold. 25° to 30° C. is the optimum, and in Korea July and August are the most favourable times. A free supply of oxygen is not essential to development. Under the most favourable conditions miracidia hatch in about 16 days. The miracidium becomes a sporocyst under the skin of the mollusc. Only one of the several rediae it produces comes to maturity. This gives rise to several daughter rediae in which cercariae with short tails develop. The time required for an egg to become cercariae in the primary intermediary is over one year. Several fresh-water crabs act as secondary intermediaries, but fresh-water shrimps are said not to harbour the parasite. The encysted form is 0·3 to 0·4 mm. in diameter. In the second host the cercaria takes about 30 days to

mature and become encysted. It can there remain alive at least for six years. Encysted forms only leave the crab accidentally. They enter man within the tissues in which they are encysted. After being freed in the intestine the young forms pierce the intestinal wall, enter the abdominal cavity, whence they migrate through the diaphragm to the pleural cavity, and so enter the lung. Extensive damage is caused during this migration.

Infection takes place chiefly through eating infected crabs, for the larva when it has escaped into water does not live long. The Koreans eat fresh crab as an antipyretic and antidiarrhoeal remedy. Control of the disease by control of the eggs passed in sputum and faeces is rendered difficult by the infection of domesticated animals in the endemic region. Extermination of the crabs is next to impossible, owing to their harbouring in the deep holes and under the stones in the river-beds. The extermination of the molluscs is also very difficult. Owing to the area involved the general use of chemicals is not recommended. Collection by labourers can be attempted and one can cover three or four square miles in a day. Popular education *re* the causal agents of the disease is helpful.

R. T. L.

KAWAMURA (Rinya) & YAMAGUCHI (Masamichi). **On the Pulmonary Distomiasis which caused Brain Symptoms in Children.**—*Japan Med. World.* 1921. Aug. 15. Vol. 1. No. 4. pp. 1–7. With 1 text fig.

The 38 cases of Paragonimus infestation of the brain, of which the authors have traced records in previous publications, represent a small percentage compared with the wide incidence of the lung disease due to this parasite in Formosa, Korea and Japan. During 1916–17 many cases of disease occurred among children which was diagnosed as cerebral infantile paralysis, cerebral haemorrhage, encephalitis, or acute meningitis. This curious disease which had been so variously diagnosed was later found to be due to Paragonimus in the brain. In a village of 686 inhabitants 11 cases of brain complications were found among children; clinical records are given of each case. The great majority of the cases seen had contracted the disease before the age of 15. The earliest cases were three to five years old. These are the outstanding clinical features:—

"It begins with sudden severe headaches with vomiting and dizziness. In many cases there are epileptic attacks with loss of consciousness and at times with delirium. At times there are also tonic or clonic spasm, with aphasia or motor paralysis. These attacks are repeated several times and may last from one to two hours or as long as ten or fifteen days. Some of the epileptic attacks are distinctly Jacksonian type. Various symptoms at the time of the onset disappear gradually, but some of the cases may retain disturbances of sensations or movements of extremities. In rare cases aphasia may develop or may have disturbances or loss of sight. Mentality is weakened in some cases and in worst cases they become idiotic."

Not a few die during the period of these attacks. Physical changes in the lungs develop in more than half of the cases. In more than half of the brain cases physical changes in the chest and eggs in the sputum were found.

R. T. L.

KIMURA (Onari). **A Case of Cysts in the Brain caused by** *Paragonimus westermani.—Mitt. a. d. Pathologischen Inst. der Kaiserlichen Univ. z. Sendai, Japan.* 1921. Vol. 1. No. 2. pp. 375–384. With 6 text figs.

Whereas in Europe helminth parasites of the central nervous system are larval tapeworms—either Echinococcus or Cysticercus—in Japan the parasites found are the adults or eggs of flukes, viz., *Schistosoma japonicum* and *Paragonimus westermani.*

The author describes in detail the results of his examination of the brain of a Japanese policeman, aged 43, in which were found great numbers of cysts due to *Paragonimus westermani.* The patient had had haemorrhage from the lungs at the age of 20 and his case had been then diagnosed as pulmonary distomiasis. Three months prior to death mental peculiarities, optical illusions and hallucinations had been noticed. At post-mortem a tumour, the size of the tip of the thumb, was seen on the left upper surface of the tentorium cerebelli, consisting of several smaller tumours ranging from the size of a pea to that of a millet-seed. Most were globular and greyish in colour and loosely united by loose soft fibrous connective tissue. The largest of these tumours measured about 20 mm. in diameter, its capsule of tendinous connective tissue was fully 1 mm. thick and was sharply defined. The surrounding nervous tissue is replaced by fibrous structures somewhat brownish in colour which probably is glia tissue. More than a dozen cysts occupied the entire lateral half of the left occipital lobe, the largest measuring about $3 \times 1 \cdot 5$ cm. Most of the cysts are connected by small canals or by fibrous bands. All the gyri are seriously atrophied through pressure. The white matter is more impaired than the grey. Large numbers of eggs are found in the neighbourhood of the cysts and are surrounded by connective tissue.

Discussing the pathogenesis of the alterations caused by Paragonimus, the author supposes "that the worms had arrived first at the furrows of the brain and built cysts there; but some of them had either crept further through the blood vessels or actively pierced the brain substance to the more or less deep layer (white matter) and caused there the building of the cysts." The cause of the enlargement of the cysts is not quite clear. The connective tissue is proliferated round the path of the worms, and the cysts form where the eggs are deposited or where the worms have remained for some time or have died.

R. T. L.

ONJI (Y.). **Das Lungen-Distoma, der Schmarotzer wilder, krabbenfangender und -verzehrender Tiere. I. Mitteilung.** [The Lung Distome, Natural Parasite of Animals which catch and eat Crabs. Part I.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. July 8. Vol. 86. No. 6. pp. 500–505.

Paragonimus westermani has been found by the author in weasel's faeces and "racoon dogs" in Japan. Other wild animals which eat crabs are otters and bears, boars and monkeys; these are also probably natural hosts. In places where these wild animals are infected, numbers of eggs must be continually cast into the streams; the miracidia which develop from them seek and find the first intermediary host, a water snail, two species of which are definitely known —(1) *Melania paucicincta*, Martens; (2) *Melania extensa*, Martens. The secondary hosts are crabs—(1) *Geothelphusa dehaanii*; (2) *Eriocheir*

[illegible] [illegible] [illegible] [illegible] As man does not eat raw crabs [illegible] does not enter into this cycle: but when crabs die in the stream [illegible] [illegible] [illegible]

BRUG (S. L.). **Un cas grave de clonorchiase traité par l'émétique. Guérison.**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 161–162.

A recent case of Clonorchis infection in a Chinaman was successfully cured by the injection of 2·95 gr. of tartar emetic spread over a period of three months. Before treatment the left lobe of the liver was enlarged, hard, and painful; the spleen swollen; there was fever, anaemia, ascites and a variable amount of oedema of the upper and lower limbs. The prognosis was considered serious. After the course of treatment not only had the symptoms subsided but eggs of Clonorchis could no longer be found in the faeces.

R.-T. L.

MUTO (M.). **Experiments on the Filtration of Water containing Encapsulated Larvae of** *Clonorchis sinensis.*—*Japan Med. World.* Tokyo. 1921. May 15. Vol. 1. No. 1. pp. 8–11.

A series of experiments is detailed which indicates that the encapsulated larvae of the Asiatic liver fluke are not entirely removed from water after filtering through a sand bed of two feet of rather coarse sand. With sand the grains of which pass a mesh of 0·15–0·2 cm. their passage is prevented.

R. T. L.

BRUMPT (E.). **Mode de pénétration des nématodes dans l'organisme des mammifères, histotropisme et histodiagnostic.**—*C.R. Soc. Biol.* 1921. July 2. Vol. 85. No. 24. pp. 203–206.

The author has used the phenomenon of histotropism, *i.e.*, tissue attraction, to further knowledge of evolution and migration of nematodes parasitic in man and animals. Larvae seem to migrate into the tissues to escape from unfavourable conditions. A freshly excised piece of calf's umbilical cord was found to exercise a great attraction on larvae of *Strongyloides vituli*, whereas they were indifferent to fragments of mouse organs.

In several hours hundreds of larvae are found in the umbilical cord—nevertheless 99 out of 100 do not show this tactism but remain in the culture. If these indifferent larvae are injected into the rectum of a rat they all bury themselves in the mucous membrane to escape from the rectal contents. Similar "indifferent" larvae injected into a rabbit *per os* migrate into the buccal mucous membrane, oesophageal wall, and pyloric region of the stomach. A mouse may die in two hours showing hundreds of larvae in mediastinum, diaphragm, eyeballs and some in the brain, although none are found in the liver, which shows that the larvae travel via the tissues and only rarely by the blood stream. This experiment shows that larvae which seemed incapable of traversing umbilical cord and skin can infect animals when passively ingested by them. Human umbilical cord was attracted and penetrated by: *Necator americanus*, *Strongyloides papillosus*, of the sheep and rabbit *S. stercoralis*, *S. suis*, *S. vituli*, S. sp. from a Macacus, S. sp. from a Cercopithecus, *Strongylus equinus* and *S. vulgaris* of the horse, *Characostomum longemucronatum* of the pig, *Trichostrongylus* (*retortaeformis?*) of the rabbit, and by a larva of a sheep parasite (*Chabertia?*). Umbilical cords of calves and sheep gave similar results.

The author, arguing from a control experiment on his own skin with larvae of *Strongyloides vituli*, maintains that larvae which can penetrate the umbilical cord are normally capable of penetrating the skin. Out of 16 species of larvae 12 showed histotropism, from which it is deduced that larvae make migrations in their hosts before reaching the adult stage. The experiments show that worms which do not normally infest man are capable of migrating amongst the tissues as if they were in their habitual host.

R. T. L.

SCHWARTZ (Benjamin). **Effects of Secretions of Certain Parasitic Nematodes on Coagulation of Blood.**—*Jl. Parasit.* 1921. Mar. Vol. 7. No. 3. pp. 144–150.

It is probable that the toxic secretions of nematodes, like snake venoms, are a complex of a number of different principles, such as haemolysins, anticoagulins and one or more systemic poisons. It is of interest that nematodes that contain anticoagulins also contain haemolysins from which they are probably chemically distinct. The author finds that the substance which inhibits coagulation of the blood is present in the posterior as well as in the anterior portion of species of Strongylus. So far as present knowledge goes the nematodes which contain substances that inhibit coagulation of the blood to a marked degree belong to the family Strongylidae, the members of which have a buccal capsule adapted to lacerate the mucous membrane. The injection of these secretions into the intestinal mucosa by certain biting nematodes, resulting in minute haemorrhages, is probably of etiological importance in nematode diseases.

R. T. L.

LEGER (Marcel). **Présence dans les matières fécales, à la Guyane, d'oeufs de nématodes indéterminés.**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 155–159.

During microscopical examinations of 5,000 stools in French Guiana three unrecognized varieties of nematode eggs were noted—(*a*) A large egg of Ascaris type, 100 to 110 $\mu \times 70$ to 40 μ, seen on four occasions. The author suggests a resemblance with the eggs of *Ascaris megalocephala* of the horse. (*b*) On two occasions an egg similar to *Necator americanus*, but much larger, viz., 88 μ 57 μ, was found and cultivated. The adult was probably a Trichostrongylus. (*c*) On one occasion an Oxyuris-like egg of large dimensions, viz., 125–130 $\mu \times$ 75 μ–80 μ, ovoid, with one pole more elongated than the other.

R. T. L.

NEVEU-LEMAIRE. **L'infestation congénitale de l'homme et des animaux par les nématodes.**—*Bull. Acad. Méd.* Paris. 1921. May 31. Vol. 85. No. 22. pp. 632–634.

Congenital infestation with Ascaris, Ankylostomes, Strongyloides and all forms of bursate nematodes will probably be found to be much more frequent than is generally supposed, especially in warm countries.

R. T. L.

SHIMURA (Sôhei) & OGAWA (Teruji). [**On the Filariform Larvae found in Vomit of a Patient infested with** *Strongyloides*.]—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1920. Oct. 2. No. 2197. pp. 1829–36.

A great number of rhabditiform larvae were found in the faeces of a man of 46 who had been suffering from chronic bronchial catarrh, chronic enteritis and nephritic cancer. In the faeces were found also numerous larvae of *Strongyloides stercoralis*, besides a few eggs of *Ancylostoma duodenale* and *Ascaris lumbricoides*. Eggs and rhabditiform larvae of Strongyloides were found fairly numerously in the vomit. Moreover, in the mucous substance, which the authors regard as sputa mixed with vomit, there were discovered two individuals of filariform larvae. The eggs and rhabditiform larvae seem to have been produced by *S. stercoralis*, which lived in or near the duodenum. On the other hand it is highly probable that the filariform larvae are on the way of self-infection, and came through the lung.

Hiroshi Ohshima.

ROUSSEAU (L.). **Le parasitisme par les anguillules en Guyane.**—*Bull. Soc. Path. Exot.* 1921. Feb. 9. Vol. 14. No. 2. pp. 124–132.

Examination of the convict population of French Guiana showed the presence of infection by *Necator americanus*, *Ancylostoma duodenale* and *Strongyloides stercoralis*. The intestinal forms of *S. stercoralis* cause emaciation and diarrhoea, and in two cases they greatly aggravated amoebic dysentery.

To determine the presence of *S. stercoralis* with certainty, a stool in which ankylostomes may possibly occur in addition should be examined not later than six hours after passing. Otherwise, one may obtain embryonated eggs or free ankylostome larvae, which in early stages are extremely difficult to distinguish from *S. stercoralis*. At a temperature of 27°–28° C., ankylostome eggs give rise to free larvae in 24 to 48 hours; these differ from the rhabditiform larva of *S. stercoralis* in the granular nature of the posterior part of the digestive tube, and in the scarcely marked rhabditiform oesophagus. The larva of *S. stercoralis* gives either a sexual form in 48 hours, or a strongyloid larva within the same period.

R. T. L.

BRUMPT (E.). **Recherches sur le déterminisme des sexes et de l'évolution des anguillules parasites (Strongyloïdes).**—*C.R. Soc. Biol.* 1921. June 25. Vol. 85. No. 23. pp. 149–152.

Strongyloides papillosus of sheep can develop in the domesticated rabbit. The author has found that whereas in sheep the parthenogenetic worm gives rise to eggs which develop into 2,000 females for every male and from 200 to 100,000 larvae by direct development, the parthenogenetic worm in rabbits gives 237 males to 409 fertile females and 1,236 larvae by direct development. In this contrast, attributable possibly to the influence of the hosts, may be found the explanation of heterogony.

R. T. L.

ROSE (F. G.). **Report of the Government Bacteriologist, British Guiana, to the Tropical Diseases Research Fund Committee for the Period January, 1919, to March, 1920.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.) 1921. June. Vol. 14. No. 8. pp. 1–15. (Discussion pp. 16–17.)

This important contribution deals chiefly with filarial diseases. Tables are given which show that infection with *Filaria bancrofti* is widespread in the county of Demerara, and especially in the city of Georgetown and its vicinity; that it attacks all races, but particularly the Portuguese. The clinical manifestations are found in greater proportion in the female than in the male, and appear to attain their maximum incidence in young adult life between the ages of 21 and 30. An investigation to determine the local mosquito carriers showed that of 1,500 female mosquitoes (of which 237 were *Stegomyia fasciata*, 105 *Cellia argyrotarsis*, 27 *Mansonia titillans*, and 1,131 *Culex fatigans*) all the infected mosquitoes (save one *Stegomyia fasciata*) belonged to the species *C. fatigans*. Infection occurred in approximately 7·4 per cent. of these. The "filarial" lymphatic gland is either varicose or the seat of solid enlargement. From the acutely enlarged gland a pure culture of streptococcus can be obtained in 90 per cent. of cases. The characteristics of the gland which has been the seat of recurrent inflammatory attacks are the marked reduction of the cellular content of the follicles and the generalized fibrosis.

From a detailed study of the Arneth index the author concludes that this is unaffected in a simple infection with *Microfilaria bancrofti*. When clinical symptoms occur it almost invariably shows a shift to the left. This shift also occurs in cases of filarial oedema and elephantiasis when not of long standing, and bears a relation to the severity and duration of attacks. These results are consistent with the assumption that pathological symptoms in these cases of filarial infection are invariably due to the influence of pathogenic bacteria and obviously supply a useful guide in prognosis and treatment. The coexistence of filarial infection with a high index points to the probability of an early onset of symptoms and is an indication of the advisability of prophylactic inoculation.

A study of the differential leucocyte count in a series of male and female patients was made. While the former showed none the latter showed a slight increase of eosinophiles which may be due to other causes. In clinical filariasis a relative increase in the polymorphonuclear cells is the first result of the onset of an attack. Favourable progress is accompanied by a relative increase in the lymphocytes. A relative increase in the neutrophils is found in the abscess-formation, in all cases at or before the climax of an attack, and in severe cases for some days after subsidence.

The paper concludes with an account of mass-experiments to test the efficacy of vaccine therapy and prophylactic inoculation in inflammatory conditions associated with infection with *F. bancrofti*. The author shows that prophylactic inoculation has a markedly beneficial effect in reducing the frequency and severity of attacks in the majority of cases, but in cases of long-standing chronic lymphangitis and lymphadenitis inoculation appears to have little or no effect.

R. T. L.

FLU (P. C.). **Beschouwingen naar aanleiding van een onderzoek over de verbreiding van *Filaria bancrofti* onder de inlandsche bevolking van Weltevreden.** [Remarks induced by an Investigation on the Spread of *Filaria bancrofti* among the Native Population of Weltevreden.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 3. pp. 317–339.

The author examined for microfilariae thick films of 1,112 male native inhabitants of Weltevreden, partly (896) settled people, partly (216) coolies living there less than one year. The former group showed infection in 10·1 per cent., the latter only in 2·3 per cent. The microfilaria found was that of *Filaria bancrofti*. The filariasis rate at Weltevreden (average 8·5 per cent.) is about the same as in the surrounding countries and far lower than the percentages in Africa and parts of tropical America.

The author thinks that the degree of infection with filaria in a population is greatly dependent on its habits. The more settled a population the higher the chances of infection and reinfection, resulting in evident filariasis. In the Dutch East Indies, *e.g.*, Atchin and Djambi in Sumatra, with a settled population, show higher figures (Djambi 23·7 per cent.). The way in which the natives store their drinking water (whether they gather rain water in special vessels or take their drinking water from rivers, etc.) may have a great influence on the breeding chances of the transmitting mosquito. The natives of Weltevreden do not store rain water, and therefore the villages do not offer so many breeding places to *Culex fatigans* and *Stegomyia scutellaris*, the principal carriers there. (Anopheles species could be experimentally infected, but many of the larvae do not develop in the body of these mosquitoes.) In every locality the habits of the population should be properly studied in relation to the spread of filariasis in order to obtain a better knowledge of the epidemiology of this disease.

W. J. Bais.

JEANSELME (E.), SCHULMANN (E.) & POMARET (M.). **Chylurie filarienne. Le rythme d'élimination des urines et leur constitution chimique.** —*Presse Méd.* 1920. May 12. No. 30. pp. 293–295. With 3 charts in text.

Two cases of filarial chyluria are recorded, with full clinical details. In spite of much research, the disease still presents certain obscure points. The author questions whether the primary factor is the position of the lymphatic pockets, or whether the microfilaria play the more important part. Generally speaking, filarial chyluria does not present any immediate danger.

R. T. L.

i. CONNAL (A.). **Observations on Filaria in Chrysops from West Africa.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Feb. 18. Vol. 14. No. 6. pp. 108–109. (Discussion, p 109.)

ii. —— & CONNAL (S. L. M.). **A Preliminary Note on the Development of *Loa loa* (Guyot) in *Chrysops silacea* (Austen).**—*Ibid.* Oct. 20. Vol. 15. No. 4. pp. 131–134.

i. Of 2,255 specimens of Chrysops collected near Sapele in Southern Nigeria 0·9 per cent. were found to be infected naturally with filaria. The largest number of flies was collected during the wettest months,

i.e., from May to July. Of the total, 2,006 belonged to the species *C. silacea* and the remainder, 249, belonged to *C. dimidiata*. Sixteen of the former and six of the latter were found to have a filaria infestation which was always heavy, and in one insect 427 worms were counted. *Filaria loa* is endemic in Sapele.

ii. With 608 specimens of *C. silacea* and *C. dimidiata* caught at Sapele the authors conducted 20 feeding experiments on cases of *F. loa* infection. From a part of the material already examined, it is found that within 24 hours of the infecting feed the majority of the embryos have reached the abdominal muscles, where they come to rest. Others have proceeded to the head and thorax. Growth is rapid, and up to the third or fourth day they are cigar-shaped. By the fifth and sixth day elongated forms are seen coiled in whorls in the musculature, especially of the abdomen. The final stage of development is reached within from 10 to 12 days, after which the larvae migrate towards the head, accumulating at the root of the proboscis and in the labium. They gain exit by the labella. Of 225 controls examined eight were found to be naturally infected, *i.e.*, 3·5 per cent. Evidence of double infection occurred in the experimentally infected flies.

R. T. L.

BAUMANN (Max). **Ueber einen Fall von** *Filaria loa*. [A Case of *Filaria loa* Infection.]—*Muench. Med. Woch.* 1921. Sept. 2. Vol. 68. No. 35. p. 1118.

The author describes a case in which he removed a male *Filaria loa* 8 cm. long, from the eyelid. In 1912, after a year's stay in the Cameroons, the patient noticed a swelling in his arm; this wandered to his hand, shoulder and leg, so that he was never without swelling for more than a month at a time. This so-called "tropical swelling," which was the size of a hen's egg, gave little trouble beyond causing a slight irritation and tenseness. After a stay of 15 months in Spain in 1916 the worm seemed to have disappeared and was believed to have become encapsuled. In 1921, 14 days before coming to the hospital, the patient noticed the worm once more in his leg, and three days before entry he saw its "head" raised beneath the skin. The worms are supposed to wander over the body until sexually mature and then, after death, to become calcified. This case is interesting because of the long duration of nine years, the usual time from the first symptoms until the appearance in the eyelids being about 14 months. The longest case previously recorded is six years.

R. T. L.

LOW (George C.) & O'DRISCOLL (Elizabeth J.). **Observations upon a Case of** *Filaria* (*Loa*) *loa* **Infection.**—*Lancet.* 1921. Apr. 16. pp. 798–800. With 3 charts in text.

With a résumé of the characteristics of Loa infection and clinical notes of a case the authors give an interesting chart showing that during a period of six days in which the patient slept during the day and thus inverted his normal habits, there was no change in a marked diurnal periodicity of appearance of the filaria embryos in the peripheral blood. Injections of tartar emetic in dosage totalling 25 gr. failed to eliminate the embryos either of *F. loa* or *F. perstans* from the blood stream.

R. T. L.

BEGLE (Howell L.). **Infestation with *Filaria loa*: Report of a Case of Filaria beneath the Conjunctiva and Microfilariae in the Peripheral Blood Stream.** – *Jl. Amer. Med. Assoc.* 1921. May 7. Vol. 76. No. 19. pp. 1301–1302.

This is a report of a case of *Filaria loa* in a patient who had spent the years between 1906 and 1909 in Southern Nigeria. An adult worm was removed from his right evelid in 1918. Although three years have since elapsed and no other adult parasites have made their appearance, microfilaria are found in the day blood whenever this is examined. It is apparent that the infestation is of from 12 to 15 years' duration.

R. T. L.

MÜHLENS (P.). **Zur Behandlung der Filariasis.** [Treatment of Filariasis.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 8. pp. 247–248.

In two cases of *Filarialoa* infection with numerous microfilariae in the blood, the author tried the curative effect of picric acid. The patients were each given about 14 gm. of picric acid over a period of two months given in daily doses of 0·25 gm. in wafers for several consecutive days, this was repeated for three days after an interval. Later, two daily doses of 0·25 gm. were tried; usually the drug was well borne. At first one of the patients complained of lumbar pain and the other showed slight albuminuria. Severe jaundice was noticeable. In one case a positive result seemed to follow, for no filariae were seen for 14 days, but they then reappeared. The number of microfilariae was lessened from time to time but there was no marked diminution. In 1919 a case of *Filaria bancrofti* from Samoa was treated for amoebic dysentery with neosalvarsan, simaruba and emetine. Microfilaria and the clinical signs of filariasis showed a notable disappearance, but this may have been an accidental circumstance, for in other cases no result was obtained with neosalvarsan or antimony. In 1913 a case was apparently cured with Arsalyt, but this also may have been a coincidence. No sure method has yet been found.

R. T. L.

SERGENT (Étienne) & GOUIHLON (Paul). **Essais d'inoculation à un singe d'une filariose humaine par des piqûres de *Culex pipiens*.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. p. 85.

This note records an unsuccessful attempt to infect *Culex pipiens* and thence *Macacus sinicus* with *Filaria perstans*. No evidence of infection of either mosquito or monkey was obtained.

R. T. L.

GUPTA (H. Das). **A Case of Filarial Cyst on the Eye.**—*Indian Med. Gaz.* 1921. Sept. Vol. 56. No. 9. p. 338.

A small cystic tumour near the outer canthus was found in a Mahommedan male, age 25, who came to the out-patients' clinic at Ramporehaut complaining of severe pain in his right eye and in the surrounding parts. This had commenced a fortnight previously as a tingling sensation accompanied by frontal headache which gradually

increased. The cyst was opened under a local anaesthetic and two fine white threadlike living worms measuring 1½ in. were found moving in the gelatinous contents and coiled up together.

R. T. L.

[illegible] **On the Pathological Changes of the Dog's Kidney caused by the Embryos of** [illegible] **and One Case of those in the Human Kidney caused by the Embryos of** [illegible] — *Kyoto Igaku Zassi.* 1921. May. Vol. 18. [illegible] Summary. pp. 40–41. In Japanese pp. 28–44.]

The conclusions as summarized from the Japanese text by the author are:—

1. The embryos of *Filaria immitis* sometimes cause parasitogenetic [illegible]
2. The embryos of *F. immitis* sometimes cause pseudotubercles in the tissues of the dog's kidney.
3. [illegible] the embryos of *F. immitis* contain some toxin [illegible] the granulation tissue produced by the embryos.
4. This toxin is perhaps endogenous.
5. When the embryos show their [illegible] at a comparatively early age.
6. The embryos sometimes cause infarcts in the kidney of the dog.
7. The author, in one human case infected with *F. bancrofti* has [illegible] and distension of the lymphatic channels and of the blood vessels, etc. Comparing these results with those seen in the dog's kidney caused by *F. immitis* the author suggests that the embryos of *Filaria bancrofti* may play a similar rôle.

R. T. L.

[illegible] **On the Study of Elephantoid Skin of a Dog.**—*Japan Med. World.* Tokyo. 1921. July 15. Vol. 1. No. [illegible] pp. 1–[illegible]

In a female dog seven years old there was a hairless area over the greater part of the back and the sides of the chest. The skin appeared [illegible] epidermis, without any exanthema. There was no growth of hair in this area at certain seasons and the area was gradually widening. Numerous larvae of *Filaria immitis* occurred in the blood. A study of sections leads the authors to conclude that the filarial larvae, while circulating in the blood, attempt to leave the host through the skin and pass through the walls of the vessels into the perivascular tissues, or come to a standstill in the vessels and cause the collections of cellular masses around them in which they die and are absorbed. The larvae found in the epidermis, hair follicles and in the sebaceous glands are those which escaped being engulfed in cellular masses. The authors believe that the elephantoid disease in the dog was caused by the invasion of many larvae of *Filaria immitis* in the limited area, but why a certain part of the skin was selected and why so many larvae were found therein they are unable to explain.

R. T. L.

[illegible] **Observations diverses concernant** [illegible] —*Bull. Soc. Path. Exot.* 1920. Dec. 8. Vol. 13. No. 10. pp. 848–858.

[illegible] —(1) The [illegible]

the Congo basin. Tumours of *O. volvulus* occur very generally among the dwellers along the main river and its principal tributaries; all districts, however, do not show equal intensity of infection. (2) Local reactionary phenomena induced by the tumours of *O. volvulus*.—The majority showed no acute inflammation; in others the tumours were filled with pus mixed with blood. Suppuration is usually limited to the interior of the tumour, the latter in some instances being partly destroyed, with more or less complete liberation of the parasites. In one case, described in detail, 26 nodules were found, without any accompanying filarial itch. In another case—a child bearing a cyst on the occiput—there occurred in addition some slight swelling of the face, puffiness of the features and dryness of the hair, which entirely disappeared when the cyst was removed. This seemed to show that the cyst was the cause of skin troubles of the head and face. (3) Localization and histology of filarial tumours. In the majority of cases the tumours did not adhere to the skin; in others there was undoubted adhesion. In only one instance did the author see a possible invasion of a lymphatic gland. (4) A case of filarial tumour in a European in whom a cyst was present on the left shoulder yielded *O. volvulus*; blood examination gave *Microfilaria perstans*. Apart from the tumour there was no additional cutaneous manifestation.

R. T. L.

MONTPELLIER (J.) & LACROIX (A.). **Le Craw-Craw ou gale filarienne; son origine dans les kystes sous-cutanés à** *Onchocerca volvulus*. —*Bull. Soc. Path. Exot.* 1920. Apr. 14. Vol. 13. No. 4. pp. 305–315. With 1 plate.

Among native troops from Africa a number showed a skin infection, or itch, occurring especially on the buttocks, sides, and lumbar region. With this were frequently associated inguinal, especially crural, swellings and eosinophilia, varying from 5 to 40 per cent. Systematic examination resulted in the discovery of the constant presence of microfilariae in the dermal layer of the skin, independent of the vascular network. These were considered to be the embryos of *Filaria volvulus*, or a very nearly allied species. The affection was regarded as identical with craw-craw as described by O'NEIL in 1875.

Further investigations showed the occurrence in some patients of fibrous cysts, one of which upon dissection yielded a male and part of a female *Onchocerca volvulus*. Filarial itch is therefore considered to be a dermal manifestation of onchocerciasis.

Professor BRUMPT, in a discussion at the conclusion of the paper, affirmed that it was impossible, in view of the distribution of craw-craw and volvulosis, to regard as justifiable the relations which the authors claim to have established between the microfilariae studied and the tumours due to *O. volvulus*.

R. T. L.

MONTPELLIER (J.), DEGOUILLON & LACROIX (A.). **La gale filarienne est-elle bien une manifestation de volvulose?** *Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 530–535.

The authors uphold their previous statements regarding the nature of filarial itch. So far as their researches have gone, filarial itch, or craw-craw, using the term in the original restricted meaning of O'NEIL,

[illegible] Except in [illegible] all the patients under observation showed fibrous tumours of [illegible] and further no single carrier of these tumours was without the eruption characteristic of filarial itch.*

R. T. L.

MONTPELLIER (J.) & LACROIX (A.). **Sur une nouvelle dermatose d'origine filarienne observée sur les contingents noirs (gale filarienne).**—*Presse Méd.* 1920. Sept. 1. Vol. 28. No. 62. pp. 607–609.

This paper gives a general account of the contents of the two preceding papers.

R. T. L.

[illegible] (E.). **Au sujet des rapports entre l'*Onchocerca volvulus* et la gale filarienne.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol 13. No. 7. pp. 535–539.

To [illegible] the assertion that filarial itch is a manifestation of onchocerciasis it is necessary (1) to show that all persons affected by the itch possess adult *Onchocerca volvulus*, and (2) that all carriers of tumours of *O. volvulus* show the skin eruption. It is extremely difficult to demonstrate *O. volvulus* tumours which are not cutaneously [illegible] In 1902 he observed 18 cases of "pseudo-itch" without visible tumours and seven cases of onchocerciasis without skin lesions, among canoe-men at Ouellé. On the other hand, in onchocerciasis of Guatemala, the skin lesions were always observed near the tumours (see this *Bulletin*, Vol. 14, p. 157). The whole collection of biological facts makes the author [illegible] of the rôle of *O. volvulus* in the causation of filarial itch.

R. T. L.

MONTPELLIER (J.), LACROIX (A.) & [illegible] (P.). **Note hématologique concernant les sujets infestés par *Onchocerca volvulus*.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 653–654.

The authors systematically examined the blood of a great number of natives infected with *Onchocerca volvulus*; some were examined [illegible] taken from the patients. The globular resistance was variable, [illegible] Enumeration of the red blood corpuscles showed slight anaemia in a certain number of cases. The number of leucocytes was always normal, [illegible]

* [illegible] was summarized in this *Bulletin*, Vol. 19, 172, under Tropical Dermatology.

2 to 50. The authors are unable to explain this great variability, which seems to follow no laws. However, the maximum eosinophilia seems to occur at each discharge of microfilariae into the blood; that is, at the beginning of each skin eruption; and the minimum to coincide with each period of microbic infection due to scratching, *i.e.*, towards the end of each eruption. Finally, the authors examined more than 30 carriers of Onchocerca for "l'image éosinophilé" of SABRAZES, and found a constant high eosinophile index of 230 276. In interpreting these results it must be remembered that the loss of leucocytic equilibrium may have been due in some of these cases to other causes.

R. T. L.

OUZILLEAU, LAIGRET & LEFROU. **Contribution à l'étude de l'*Onchocerca volvulus*.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 717–728.

The authors describe a region along the right bank of the Congo, where disease from infection with *Onchocerca volvulus* is very common. In the village of Djoué, near Brazzaville, 16 out of the 27 inhabitants were attacked; five had cutaneous lesions in addition to cysts, and one had keratitis. The clinical details of three cases may be summarized as follows:—

1. Puncture of the cysts gave 13 positive results out of 15. Puncture of lymphatic glands gave 8 positive results out of 15. Puncture of cysts and lymphatic glands gave negative results in one case, Onchocerca disease being diagnosed by the presence of *Microfilaria volvulus* in the skin.

2. *Microfilaria volvulus* was never found in the blood; *Microfilaria perstans* occurred in 5 of the 15 cases.

3. Clinically, in addition to cysts, elephantiasis and ocular lesions, the following macroscopic lesions were noted:—pseudo-icthyosis, Icthyosis simplex and lichenization.

Histo-pathological lesions.—There is an infiltration of connective tissue and mononuclear cells in the dermis, and *Microfilaria volvulus* are always found in it. In the places where pigment is lacking, a dense connective tissue is found which contains neither vessels, glands nor microfilaria. In the epidermis general hyperkeratosis is noticed, often with infiltration of the stratum germinativum and stratum filamentosum with leucocytes. In the lichenosed zones enlarged dome-like papillae are found; in the regions of prurigo similar lesions are found, as described above, with blisters, in addition, which completely destroy the epidermis. In the leucodermic areas there is complete absence of pigment, and the horny layers are much thinner than usual. In the cysts, microfilariae are found only rarely. In the elephantiasis lesions parakeratosis exists, papillary vessels are very dilated, microfilariae swarm in the dermis and spread into the hypodermis. Sebaceous glands are very rare, and sudoriporous glands are entirely absent.

From these clinical and histo-pathological facts the authors draw the following conclusions:—(1) Subjects infected with *O. volvulus* always have *Microfilaria volvulus* in the dermis. (2) In the authors' opinion "craw-craw" is not connected with Onchocerca disease. (3) They state tentatively that the cutaneous lesions are not caused

through pruritus, but that the *Microfilaria volvulus* creates inflammatory reactions in the skin, which manifest themselves by pseudo-ichthyosis, elephantiasis of the genitalia and other parts, by achromy and cutaneous atrophy.

R. T. L.

SHELS (C. W.). **A Probable (Third) Case of** *Gongylonema hominis* **Infection in Man.**—*Public Health Rep.* 1921. May 27. Vol. 36. No. 21. pp. 1177–1178.

Two cases of human infection with the Nematode *Gongylonema* are on record. In both instances the parasite was removed from the lower lip. The following details are given concerning a third case, found in Georgia, U.S.A. Unfortunately the specimen is macerated; "much of the cuticle is destroyed, but by good fortune a fragment of the cuticle showed two of the 'bosses' which characterize the anterior end of Gongylonema; further, the pharynx excludes *Loa* from consideration." In order to avoid "erroneous deductions as to life history," the author suggests, on purely empirical grounds, that this worm and that described by WARD [this *Bulletin*, Vol. 8, p. 205] as possibly identical with *G. pulchrum* be referred to as *G. hominis* sp. dub.

"The patient, a woman about 50 years of age, came to my office complaining with sore throat. She gave a history of having had this trouble for about three weeks, and having had treatment from a throat specialist for a supposed pharyngitis. Upon examination I found an abrasion of the mucous membrane around the anterior pillar of the tonsil; this abrasion seemed to be healing, but near the angle of the jaw there was another abrasion which presented a rather pronounced hyperemic condition. This area was very sensitive to touch, and patient complained of tickling, pricking sensation at times. The areas were touched with a 10 per cent. silver nitrate solution and patient was given a mild antiseptic mouth wash; a purge of calomel was also given. About three days later she returned and complained of a soreness on other side of throat. An examination showed another abrasion similar to the previous ones but on the opposite side of mouth and about one inch anterior to the angle of the jaw. This time it was again touched up with silver nitrate and patient given a mouth wash containing a very strong solution of thymol. The next day she came back to office with the worm. She stated that she felt something like a thread with her tongue, and taking a mirror she was able to grasp the worm with the fingers and pull it out. At this time the worm was very active, and lived, after being placed in a vial of water, for several hours, perhaps longer."

R. T. L.

FAURÉ. **A propos de trois cas de ver de Guinée.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. (Numéro exceptionnel). pp. 79–86.

Between October, 1914, and July, 1915, a number of cases of guinea-worm among Colonial troops were treated at the Ambulance Coloniale de Saint-Louis. Three cases, which are described in detail, proved especially interesting, two on account of the exceptional location, the third because of the abundance of the parasites. In the first patient tumours occurred in the right iliac region, immediately above the crural arch, and in the right thigh, at the level of the triangle of Scarpa; in the second case, in various situations in both legs, one of which was painlessly swollen throughout.

R. T. L.

KONDO (Kiichi). **Experiments on the Infection of** *Ascaris lumbricoides.*]

i. **Percutaneous Infection.**—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1920. June 12. No. 2181. pp. 1123–5. Also: *Taiwan Igakkai Zasshi* (*Jl. of the Med. Assoc. of Formosa*). 1920. July 31. No. 211. pp. 630–3. [English summary p. 5.]

ii. **Infection through Mouth.** *Tokyo Iji Shinshi.* 1920. July 24. No. 2187. pp. 1407–11.

i. The young of *Ascaris lumbricoides* formed inside the egg-shell has never been known to hatch out of the shell when kept outside the body of a host. The author treated faeces which contained Ascaris eggs with animal charcoal and put it out of doors, protecting from the direct sunshine and from becoming dry. In the course of two weeks the eggs began to segment, and after seven weeks young were found moving slowly inside the egg-shell. Still some days later, viz., about 70 days after the commencement of the culture, the young, measuring 0·2–0·25 mm. were found hatched out and moving very actively. These young could live in wet soil for more than a month.

If smeared on the skin of young guinea-pigs, such artificially hatched young successfully attacked the host, some of them being found both in the lung and liver.

ii. These young Ascaris artificially hatched were subjected to various digesting media to see how long they can withstand these. In the artificial stomachal juice, prepared in two different ways, the young could live for 2–9 hours. In both the human stomachal juice and artificial intestinal juice, they were found alive as long as six hours. Further, it was proved that if such artificially hatched young of Ascaris were eaten by rats they can develop within the lung and liver.

Hiroshi Ohshima.

KONDO (Y.). **Infection with Ascaris Larvae through the Mouth.**—*Taiwan Igakkai Zasshi* (*Jl. of the Med. Assoc. of Formosa*). 1920. Sept. 30. No. 212. [In Japanese: English summary p. 2.]

Ascaris larvae were obtained from mature eggs and fed to rats. Live larvae were found in the stomach and intestine five hours afterwards. The larvae also remain alive in natural human gastric juice, as well as in artificial preparations, for three or four hours. It is therefore established that infection with Ascaris through the mouth may occur by ingestion of larvae as well as of eggs with food.

R. T. L.

STEWART (F. H.). **On the Life History of** *Ascaris lumbricoides*, **L. Part V.**—*Parasitology.* 1921. Mar. Vol. 13. No. 1. pp. 37–47. With 8 text figs.

The results of new experiments are recorded. These were designed to ascertain (*a*) whether after the administration of ripe eggs of *A. suilla* to pigs the resulting worms could live and develop in the intestine beyond the 14th day, to which the author had previously traced them experimentally. They were found up to the 19th day. (*b*) To observe if larvae of *A. suilla* passed in the faeces of mice could infect pigs. These experiments failed, probably owing to technical difficulties.

The anatomy of the larval *Ascaris suilla* found on the 19th day and the development of the cuticle and lateral membranes, of the oesophagus and excretory cell are described and figured. The paper concludes with a discussion of the route taken by the larvae of *A. suilla* in their migration through the tissues of the host. The great frequency of the larvae in dilated blood capillaries, venules and veins of the liver supports the author's original contention that the path of invasion followed by the great majority of the larvae is by the blood-stream and that they are guided by thigmotropism. Pigs over two months old are little susceptible to infection.

R. T. L.

RANSOM (B. H.) & CRAM (E. B.). **The Course of Migration of Ascaris Larvae.**—*Amer. Jl. Trop. Med.* 1921. May. Vol. 1. No. 3. pp. 129–156. With 5 text figs. and 2 plates.

Experiments and observations made by the authors clearly demonstrate, in opposition to the conclusions of YOSHIDA, that the passage of the larvae of ascaris is in the portal vein to the liver, thence by the hepatic veins and vena cava to the right side of the heart, from which they reach the lungs by the pulmonary arteries. Many newly hatched larvae also pass from the intestine to the mesenteric lymph nodes and so may reach the heart without traversing the portal circulation. Larvae are commonly present in the peripheral lymph nodes, spleen, kidney, and other viscera, presumably from the systemic circulation. The authors are unable to confirm YOSHIDA in his view that the larvae piercing the intestinal wall enter the abdominal cavity or pass thence through the diaphragm into the pleural cavity. In vitro ascaris larvae under 800 μ in length die in artificial gastric juice at 35°C. within three hours, while those of 1 mm. or longer isolated from the lungs of infected animals commonly survive this period.

[A beautiful series of microphotographs illustrate the paper.]

R. T. L.

FÜLLEBORN. **Ueber die Wanderung von Askaris- und anderen Nematodenlarven im Körper und intrauterine Askarisinfektion.** [The Migration of Ascaris and other Nematode Larvae in the Body, Intrauterine Ascaris Infection.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 5. pp. 146–149. With 1 text fig.

Experiments demonstrate that *Ascaris lumbricoides* larvae pass from the intestine *via* the hepatic portals to the liver and thence by the hepatic veins to the lungs. The author has also shown that ascaris larvae pass to the kidneys by the blood stream, not by boring into the organ from the surface. Further experiments prove that the larvae pass from the arteries to the veins not only by boring their way through the capillary walls but also by passing along the channels of the capillaries. In Strongyloides, at least, the typical haemorrhages in the lungs are caused by the borings of the larvae, for if dead larvae are introduced these do not occur in any noticeable quantity. By the blood stream ascaris larvae should eventually reach the placenta—a supposition which has proved correct, for the finding of 2–3 week old Belascaris in dogs 4–5 days old is reported. The larvae for these experiments were procured by chopping up an organ containing

larvae. This mince is placed on very fine tightly drawn gauze and left in saline solution at body temperature for several hours—the larvae bore through the gauze and fall into the vessel underneath—any detritus attached to them can be got rid of by adding the filtered intestinal juice of a dog, which digests the detritus without harming the larvae.

R. T. L.

FÜLLEBORN (F.). **Askarisinfektion durch Verzehren eingekapselter Larven und ueber gelungene intrauterine Askarisinfektion.** [Ascaris Infection through Ingestion of Encapsulated larvae. Intrauterine Ascaris Infection.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 367–375. With 3 text figs.

The author carried out experiments to show that Belascaris in dogs does not need an intermediate host for development. He injected thousands of Belascaris larvae under the skin of a pregnant bitch; 13 days afterwards the puppies were born. Whereas in most new-born dogs only a few Belascaris are found, in each of these over 100 were present. The author has also been able to prove that the small cysts (0·3—0·5 mm.) which occur in the liver, kidney and muscles, etc., of dogs are due to Belascaris—each contains one or two small worms; the encapsuled larvae can remain alive for many months. If material containing such cysts is fed to guinea-pigs and mice the animals develop similar cysts, which shows that the capsules become digested and the free larva behaves exactly as if it had just escaped from its egg; also a dog may become infected in the same way. It is also possible that if man ingests Belascaris eggs similar cysts may develop in his organs. The pathological importance of these cysts is not yet known.

R. T. L.

FÜLLEBORN (Friedrich). **Ueber Askaridenlarven im Gehirn.** [Ascaris Larvae in the Brain].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 2. pp. 62–63.

Having previously found ascaris larvae in the kidney the author believed that they reached this organ *via* the blood stream, and he concluded that if they travel from the lung by the blood stream then they should be found also in the brain. A few days after experimental feeding with ripe eggs, ascaris larvae were found by him in the brain. The larvae do not affect the brain in any way, even when many thousands are injected directly into the carotid artery. Since only solitary larvae remained in the brain a week after feeding the author believes that the greater number return to the lung in the blood stream. As was to be expected larvae were found in all organs which receive an abundant blood supply, *e.g.*, heart muscle. The author draws the conclusion that in human beings ascaris larvae which have passed from the lung by the blood stream to the brain and other organs are probably harmless. He remarks on the numerous worm patches on the lungs of his experimental dogs, which to the naked eye look just like tubercle, and questions whether this appearance may not also occur in man.

R. T. L.

PENTLAND (Charles). **The *Ascaris lumbricoides* as the Cause of Urgent Symptoms in Diseases amongst Children.**—*Practitioner.* 1920. April. Vol. 104. No. 4. (No. 622.) pp. 313–315.

The writer gives details of several cases with high temperatures, acute pain and symptoms sometimes closely simulating an attack of peritonitis or appendicitis in its early stage, all of whom passed worms after treatment with a diaphoretic mixture and santonin and hydrarg. c. cret. After this treatment the temperature dropped, the pains disappeared and the patients recovered completely. In one case, in addition to the other symptoms, a distinct degree of jaundice was present; this case had passed worms frequently a month before this actual attack; santonin and hydrarg. subchlor. were prescribed, and two days later a large roundworm was evacuated. The calomel (1 gr.) was continued for six days; the jaundice rapidly cleared up; three small worms were passed. About the twelfth day the patient had completely recovered. The author is of opinion that the worm must have obstructed the common bile duct, thus causing the temporary jaundice.

R. T. L.

BOURGES (Henry). **Troubles nerveux dans deux cas de lombricose intestinale. Rôle pathogène des toxines ascaridiennes.**—*Arch. Méd. et Pharm. Nav.* 1921. July–Aug. Vol. 111. No. 4. pp. 312–318.

Two cases of severe intestinal infection with Ascaris in children, accompanied by acute nervous troubles, are described, with special reference to the question of the production of toxic substances by the parasites.

The author, summarizing the work and conclusions of a number of investigators, concludes that the ascarids give rise to toxins which are absorbed by the intestine; the toxins gradually produce an effect on the organism, and under the influence of some liberating cause of which we know nothing, anaphylactic symptoms suddenly appear. The nervous manifestations observed are the clinical expression of this liberation.

R. T. L.

PALERMO (Pedro). **A ascaridose.**—*Brazil Medico.* 1921. April 9. Year 35. Vol. 1. No. 15. pp. 180–183.

The author enlarges on the protean character of the semeiology of ascariasis and cites cases in which diagnoses of epilepsy, meningitis, paratyphoid, and hepatic colic were falsified by the administration of a vermifuge leading in each case to the expulsion of ascarids and the rapid disappearance of symptoms. The author states, quoting as his authority Dr. Joao Sette Camara, that a constant feature of ascariasis, and indeed of all intestinal verminoses, is a condition of hypertrophy and hyperaemia of the fungiform papillae of the tongue.

F. S. Arnold.

CROWELL (Bowman Corning). **The Dangers of Ascariasis.**—*Amer. Jl. Med. Sci.* 1920. Mar. Vol. 159. No. 3. (No. 576.) pp. 380–398. With 3 figs.

Ascaris lumbricoides has a wider geographical distribution in all climates and latitudes and infests a larger number of people than any other known intestinal parasite. The author quotes the following

statistics from the Philippine Islands illustrating its incidence there. In 1911, 62·3 per cent. of 4,278 persons were infected with Ascaris as compared with 54·37 per cent. with hookworm; out of 19,302 examinations, 61·36 per cent. had Ascaris, 30·57 per cent. hookworms. In other places the incidence of the Ascaris runs up to almost 100 per cent. The pathological effects of Ascaris are:—(1) Mechanical; (2) as a carrier of infection during its migrations; (3) the larvae cause a broncho-pneumonia in experimental animals and may do so in some cases of infants; (4) the presence of a harmful toxic substance is a danger and causes reflex nervous symptoms.

The author deals with these effects in great detail.

R. T. L.

MUSSIO (Richard). **Schwere Formen von Askaridiasis.** [Severe Forms of Ascariasis.]—*Muench. Med. Woch.* 1921. Oct. 28. Vol. 68. No. 43. pp. 1395–1396.

The author gives clinical details of three cases of severe ascariasis:

1. The patient, aged 49, suffered from her thirtieth year from frequent sudden abdominal pains and gall-stones. Recovery was complete after an operation, at which one gall-stone and one large Ascaris which was wedged in a wide bile duct were removed. It is impossible to state definitely that the Ascaris caused the cholelithiasis, although this is quite probable. Why ascarids, which normally live in the small intestine, should travel into the bile ducts is as yet unknown.

2. Patient No. 2, who was previously in good health, had a sudden attack of severe abdominal pains. At operation a conglomerate mass of 28 Ascaris was found in the ileum, causing obstruction.

3. Patient No. 3 entered the hospital suffering from what was diagnosed as influenza. On the third day Ascaris eggs were found in the faeces; on the fourth day one Ascaris was passed in the stools. After treatment with oil of chenopodium 21 Ascaris were passed. After removal of the parasites the patient recovered completely.

The author believes that the toxic effects produced by Ascaris are due not to one but to many pharmacologically active substances.

R. T. L.

NISHIDA (T.). **Intraperitoneal Swelling Caused by Parasitic Worms.**]—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1920. Aug. 28. No. 2191. pp. 1614–1618.

A swelling of a size of 11·5 by 9 by 8 cm. and firmly adherent to the abdominal wall was formed at the lower part of the abdomen, on the right side, in a woman 49 years of age. It contained thick yellowish-green pus and numerous eggs measuring 0·04 to 0·07 mm. in diameter, and was formed by an *Ascaris lumbricoides* which had emerged from the intestine into the abdominal cavity. There are two possibilities as to the route of the worm:—(1) It might have come out through the intestinal wall when quite young and had attained the mature stage, or (2) the full-grown worm might have penetrated the intestinal wall. Although it is known that young Ascaris penetrate into the abdominal cavity through the healthy intestinal wall, it is highly improbable that they can grow to so great an extent after having got inside the abdominal cavity. As to the second possibility, which seems more probable than the first, there was found on the intestinal wall no perforation nor trace of perforation which would have served as an exit. It is also doubtful whether the adult worm can penetrate through the healthy intestinal wall, as the young do normally.

Hiroshi Ohshima.

HAKANSSON (E. G.). **Ascariasis and Appendicitis : Report of a Case.**—*U.S. Nav. Med. Bull.* 1920. July. Vol. 14. No. 3. pp. 394–395.

This is a case of severe ascaris infection in a young girl. An operation for appendicitis showed the presence of an enormous number of worms in the ileum, jejunum and appendix, the latter presenting an advanced stage of inflammation. Death occurred eight hours after the operation. More ascarids were found in the peritoneal cavity, between the liver and diaphragm, making a total of 224 worms recovered from the child.

R. T. L.

PILLAY (T. Maduramuthu). **Strange Migration of a Round Worm.**—*Indian Med. Gaz.* 1921. Mar. Vol. 56. No. 3. p. 100.

After incision of a soft fluctuating swelling at the upper part of the scrotum in a boy seven years of age a disintegrating roundworm escaped, with about an ounce of thick, creamy foul-smelling pus. There was no subsequent discharge from the abscess, and the wound healed rapidly. The boy had been ailing for more than a fortnight with fever and pain in the abdomen, and the swelling first appeared ten days previous to operation. The course taken by the worm would appear to be similar to that of an oblique inguinal hernia.

R. T. L.

KONDÔ (Kiichi). [**A Case of** *Ascaris lumbricoides* **found Parasitic inside the Pleural Cavity.**]—*Taiwan Igakkai Zasshi* (*Jl. of the Med. Assoc. of Formosa*). 1920. Feb. 8. Nos. 206–7. pp. 116–117.

The patient was a male aboriginal of Formosa, 11 years of age. A sharp pain had been felt at the lower part of the right side of the chest. Ascaris eggs were found abundantly in pus obtained from the affected part. When operated upon, a dead female specimen of *Ascaris lumbricoides* was found inside the pleural cavity. There was no communication between this cavity and the liver.

The eggs of the same parasitic worm were also found in faeces abundantly, and later, as a result of the use of santonin, 51 individuals of Ascaris were obtained.

Hiroshi Ohshima.

VALLET. **Un cas de stenose du cardia due à la présence d'***Ascaris lumbricoides* **dans la portion thoracique de l'oesophage fortement ectasiée.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. (Numéro exceptionnel.) pp. 88–89.

The author cites a case of the presence of *Ascaris lumbricoides* partially occluding the distal end of the dilated oesophagus. By the use of Faucher's tube an Ascaris worm and about 100 grms. of caseous milk were expelled. The liquid was found to contain eggs of *A. lumbricoides.*

R. T. L.

SABRAZÈS (J.), PARCELIER (A.) & BONNIN (H.). **Lombricose du canal de Wirsung, pancréatite hémorrhagique.**—*C. R. Soc. Biol.* 1922. Jan. 21. Vol. 86. No. 3. pp. 149–151. With 2 text figs.

The authors describe the following case of haemorrhagic pancreatitis :—A man 31 years old, previously in good health, was suddenly seized with severe abdominal pains, hiccough and flatulence. The condition becoming serious, he was sent to hospital. The facies was not peritoneal, and the pulse was 60. Laparotomy revealed sero-sanguinary effusion in the serous membrane, blood infiltration of the viscera, especially the pancreas, and several patches of suspected fat necrosis. Death took place during the day. The autopsy showed the lesions of haemorrhagic pancreatitis.

On microscopical examination an Ascaris 1½–2 mm. thick was found obstructing the canal of Wirsung, stretching from a point 3 cm. from the ampulla of Vater to the tail end of the pancreas. The author thinks that the migration of the worm from the duodenum into the pancreatic canal was the prime cause of the pancreatitis.

R. T. L.

CHASTANG. **Cas mortels de lombricose.**—*Arch. Méd. et Pharm. Nav.* 1921. July–Aug. Vol. 111. No. 4. pp. 319–324.

Three fatal cases of Ascaris infection are described. Autopsy in the first undoubted case showed the intestine torn through in numerous places and ascarids issuing through the tears.

R. T. L.

STEINEGGER (Alfred). **Ein Fall von Ascaridenileus.**—*Schweitz. Med. Woch.* 1921. July 14. No. 28. pp. 654–655.

The author describes the following case of intestinal obstruction caused by a number of ascarids. A child aged six years had suffered from ascarids two years earlier and had been treated with santonin. No worms had been seen recently. At the end of October she fell suddenly ill with acute appendicitis, was operated on on November 1st, and left the hospital as cured. On December 7 she suddenly became ill with abdominal pains and frequent vomiting. On clinical examination an ileus was diagnosed, and an operation was performed. On opening the abdomen a much-distended convolution of the small intestine was immediately seen which proved to be filled with ascarids; surrounding this distended portion was an adhesion ½ cm. broad which almost completely obstructed the lumen of the intestine and at its further end was attached to the caecum. These adhesions were detached, a small slit made in the intestine, and the entangled mass of worms picked out—16 ♀ and ♂ ascarids in all. After the operation the patient recovered completely. The above case is interesting because an existing stenosis seems to have caused the ascarids to become entangled and so lead to the obstruction. The cause of the adhesions may have been the acute inflammatory disease of the intestines of the previous few weeks.

R. T. L.

STILES (C. W.). *Ascaris lumbricoides* **caught in the Eye of a Shoe-Button.** —*Jl. Amer. Med. Assoc.* 1921. Jan. 22. Vol. 76. No. 4. p. 239.

A female *Ascaris lumbricoides* sent by Dr. F. K. Travers Warrick, of Richmond, Va., to the author, in 1910, is threaded through the eye of a large shoe-button and is securely fastened about one-third of its length from the head. Other similar cases are quoted from earlier literature.

R. T. L.

CIUREA (J.). **Sur la source d'infestation par l'Eustrongle géant (*Eustrongylus gigas* Rud.).**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 532–534. With 1 text fig.

During some feeding experiments on dogs with different species of fish from the Danube, in order to obtain infection with Opisthorchids, one, fed on *Idus idus*, showed at death a living female *Eustrongylus gigas*, Rud., entangled in the coils of the intestine. Since this Nematode frequently occurs in fish-eating animals, fish can be considered as having been the source of infection in the dog. Infection with allied species is similarly acquired in fish-eating birds. The larvae, which are described and figured, were found in the muscles of *I. idus*.

R. T. L.

POPOWSKI (N.). **Ueber den Blutbefund in den Fäzes bei Trichozephalus dispar und anderen Darmschmarotzern.** [Detection of Blood in Faeces in Infestation with *Trichocephalus dispar* and other Intestinal Parasites.]—*Muench. Med. Woch.* 1921. Nov. 11. Vol. 68. No. 45. p. 1455.

The author examined 890 cases for worms, making at the same time tests for blood in the faeces by the benzidine and phenolphthalein reactions. The cases comprised 292 men, 417 women and 181 children. In 515 cases (57 per cent.) worms were found—*Trichocephalus dispar* in 455 (51 per cent.), *Ascaris lumbricoides* in 20 (2·2 per cent.), *Bothriocephalus latus* in 6 (0·7 per cent.), *Taenia solium* in 6 (0·7 per cent.), *Oxyuris vermicularis* in 3 (0·3 per cent.), Ascaris and *T. dispar* in 18 (2 per cent.), *T. solium* and *T. dispar* in 4 (0·4 per cent.), *B. latus* and *T. dispar* in 2 (0·2 per cent.), Ascaris, *T. dispar* and *T. solium* in 1 (0·1 per cent.).

The blood tests were positive with *T. dispar* in 106 cases (23 per cent.), with *Ascaris lumbricoides* in 15 (75 per cent.), with *B. latus* in 2 (33 per cent.), with *T. solium* in 1 (17 per cent.), with *A. lumbricoides* and *T. dispar* in 7 (40 per cent.), with *B. latus* and *T. dispar* in 1 (50 per cent.). All the others gave negative blood tests. In the 375 cases in which no intestinal worms were found the blood test was positive in 54 (14 per cent.). By this it will be seen that a positive blood reaction is not a certain indication of the presence of Trichocephalus.

R. T. L.

MONTOYA (T. Wenceslao). **Tratamiento del "Tricocefalosis" por el jugo de higueron.** [Treatment of Trichocephaliasis by Ficus latex.]—*Repert. de Med. y Cirug.* Bogota. 1920. May Vol. 11. No. 8. pp. 432–445.

The author quotes MANSON as saying, after describing trichocephalus as inoffensive, "it is fortunate that this is so as no method of expelling it has been found." GUIART recommends thymol, and this is probably the least unsatisfactory of the vermifuges in current use against trichocephalus. It is to Colombia, states the author, that honour is due for the discovery of a true specific against trichocephaliasis in Ficus latex (*leche de higueron*).

The leche de higueron, now apparently largely used in Brazil and Colombia as a vermifuge, is a yellowish white liquid very like cow's milk in appearance. It readily ferments, frothing freely and giving off carbonic acid gas. In its natural state it is a perfect emulsion of rubber and resinous substances in a slightly sweet vegetable juice. It contains also an albumin and a substance of undefined composition readily yielding ammonia.

The author is of the opinion that the active principle resides in the ammoniacal substance. It has not, so far, been possible to isolate this. The following dosage table is given :—

Children	from 12–18 months	.. ..	15 gm.
,,	,, 2–2½ years	.. ..	20 ,,
,,	,, 2½–5 ,,	.. ..	25 ,,
,,	,, 5–8 ,,	.. ..	30 ,,
,,	,, 8–15 ,,	.. ..	35 ,,
Adults	.. ..	..	40–45 ,,

The routine of treatment is:

The day before the drug is administered the patient is kept on milk diet after the first meal. A saline purge is given in the evening. Next day the whole dose is taken, fasting, in a little syrup or honey. Two hours after the dose a purgative dose of castor oil. Milk diets on this day also. In some cases a single dose brings about a complete cure; more often, however, it has to be repeated. Ordinarily the leche de higueron causes no toxic symptoms. Like other drastic purgatives, however, it may cause colic, nausea, and vomiting. Occasionally more serious symptoms present themselves, such as cramp, delirium, sudden and intolerable urticaria, syncope, vertigo, convulsions, rectal and vesical tenesmus, partial suppression of urine, etc. These symptoms generally disappear completely in a few hours.

F. S. Arnold.

DARLING (Samuel T.). **Observations on the Geographical and Ethnological Distribution of Hookworms.**—*Parasitology.* 1920. Sept. Vol. 12. No. 3. pp. 217–233.

The species of hookworm present in a particular race or district depends upon geographical, racial and climatic conditions. A people as a whole will only harbour the species whose embryos are present in the soil in the immediate environment. During migration these people will have carried their peculiar species into regions in which the endemic species is different. Thus, by a survey of the intestinal hookworms, the origin of a given people can be determined to a certain degree. Thus there has been a migration from India or Burmah into Java, Bali, Timor, Lombok and Madura. The primitive distribution of *A. duodenale* seems to have been limited to regions north of 20° N. lat.; that of Necator south of this line, as shown by the nearly pure cultures from natives of Africa and India. *A. duodenale* may have been carried to and from the Orient by the old trade routes.

A survey of existing tribes in India may disclose the presence of (*a*) a stock free from hookworms derived from Asiatic Transbehring ancestors; (*b*) a stock with both *A. duodenale* and *Necator* derived from Asiatic Trans-pacific ancestors; (*c*) a stock with pure *Necator* infection derived from Polynesian or Indonesian Trans-pacific ancestors.

R. T. L.

DIOGO (H. Cesar). **Prophylaxia da opilação em Cosmopolis e arredores.** [Prophylaxis of Ankylostomiasis in Cosmopolis and its Environs.]—*Serviço Sanit. Estado São Paulo.* 1920. N.S. No. 16. 43 pp. With 11 illustrations, 1 chart and 1 map.

An account of the work of the author's commission, appointed by the Serviço Sanitario of the State of S. Paulo (Brazil), to undertake a campaign against uncinariasis in the small inland town of Cosmopolis, and the surrounding district. The "dispensary method" was rejected in favour of domiciliary visiting. A staff of six clinical assistants mounted on mule or horseback, and each working in a defined zone, rode round the district collecting specimens of faeces for laboratory examination and personally administering the medicine to those requiring treatment. Lectures were discarded in favour of the method of domiciliary propaganda, which was found to work well. In talks, accompanied by practical demonstrations, instruction was given to the

clinical assistants *re* transmission, prophylaxis, etc., to be passed on by them to the population. Those who proved least accessible to these methods were visited personally. In this manner every individual was visited, 96 per cent. of those requiring it received treatment, and latrines were established in every dwelling.

The author discusses the anthelminthic virtues of chenopodium, thymol and naphthol B., and expresses a preference for the last named.

F. S. Arnold.

HACKETT. **O problema da uncinariose.**—*Brazil Medico.* 1920. July 31. Vol. 34. No. 31. pp. 497–499.

The author states that even in S. Paulo microscopic examination showed that of 13,000 land workers 11,000, or 84 per cent., were infested by hookworms, although it is the most progressive State of Brazil, and cases of grave anaemia are not so numerous as in the north of Brazil, in the State of Rio, or on the Santa Catharina littoral. It appears that microscopic examination gives an error of about 15 per cent., for when the faeces of 500 of these were subjected to a worm count only one or two were found free from infestation, and these cases were members of the families of superintendents. The author is of opinion that 99 per cent. of the rural population of Brazil are infected. A worm count in children of five years of age gave an average of three worms; at seven the average was 15 to 20, at nine 30 to 50. The author doubts the advantage of treating children below five years of age, unless their anaemia is grave, in view of the toxicity of chenopodium in the young. Again, persons of 50 and upwards rarely harbour many worms, and it is only among young adults that uncinariasis is a true scourge. Women at the age of 19 carry the largest number of parasites; from then onwards the number diminishes progressively. This is the case also in Itatiaya, State of Rio, where arable and dairy farming are carried on concurrently, and in other places. Girls carry as many parasites as boys up to the age of 19. They then cease to accumulate them, and, in fact, begin spontaneously to rid themselves of them.

As regards treatment the author states that his observations entirely bear out the recommendations of DARLING. Microscopic examination of the faeces is, in the author's opinion, unreliable as a criterion of complete cure, its chief value being in the distinguishing of slight from severe infections.

F. S. Arnold.

MHASKAR (K. S.). **The Prevalence of Ankylostomiasis in the Madras Presidency. No. III. Hookworm Infection as a Predisposing Factor in Medical Diseases.**—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 395–397.

Investigations in Trichinopoly jail are tabulated to show the case-rate and death-rate from bowel complaints in the treated and untreated for hookworm, and it is clear that the average death-rate and the average period of illness from bowel complaints are lessened where there is freedom from hookworm. Similarly, a comparison of the case-rate and death-rate in the treated and untreated for hookworm during an epidemic of influenza shows that freedom from hookworm seems to diminish the susceptibility.

R. T. L.

MEGAW (J. W. D.). **Report on Hookworm Infection in the United Provinces.**—*Indian Jl. Med. Res.* 1920. Apr. Vol. 7. No. 4. pp 840–863.

During investigations into the occurrence of hookworm in the United Provinces, an enquiry was made into the prevalence of the infection in jails and the large hospitals of Agra and Lucknow, with special reference to its relative frequency among dwellers in large cities as compared with those from rural districts. It was found that hookworm is extremely prevalent throughout the provinces, a higher percentage being observed among persons living in the country districts than among those in towns. The percentage of females attacked was found to be less than that of males. Among Hindus 88·04 per cent. harboured hookworms, among Mohammedans 60·38 per cent. The high rate of infection is considered to be the cause of serious economic loss to the Provinces by reason of the general decrease in the standard of health and the large number of cases of serious illness. It is urged that courses of instruction should be given to medical officers; lectures, newspaper articles, etc., to the people; dispensaries and necessary drugs should be provided, and experimental work, including preventive measures and treatment, be carried out in selected villages.

R. T. L.

DAKEYNE (D. I.); GRAHAM (J. D.). **Ankylostomiasis in Mesopotamia.** [MS. Report dated September 26, 1921. Received from the Colonial Office.]

Dr. D. I. Dakeyne, Civil Pathologist, Baghdad, reports that of 321 stools of Arabs examined at the New General Hospital, 33, or 10·3 per cent., contained ankylostome ova. He does not think that the proportion of infected Arabs in Baghdad would much exceed 10 per cent., but possibly infection is much heavier in irrigated areas. He investigated 18 cases of anaemia, most of which were severe and were definitely shown to be due to ankylostome infection.

Colonel J. D. Graham, I.M.S., Director of Health Services, points out that the population of Irak is in the main a scattered one, with, in certain areas, continuous migration "so that areas which are lived on could not become sodden with infection as would coolie lines with inadequate conservancy."

A. G. B.

MACCALLAN (A. F.). **The Ankylostomiasis Campaign in Egypt, 1913 to 1915.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.). 1921. Oct. Vol. 14. No. 12. pp. 71–74.

After succinctly summarizing the steps which led to a series of surveys in the provinces of Sharqia and Assiût, the author gives the following opinion as regards the direction in which measures can most usefully be employed against ankylostomiasis in Egypt:—"There are three main lines along which investigation should be directed as a preliminary to any further campaign. First, a knowledge must be obtained of the habitat of the larvae which infect man by piercing his skin; secondly, a workable system of village sanitation must be evolved, which up to the present is entirely unknown; thirdly, further investigation of the nature and method of action of the ankylostoma toxin should be undertaken, not only with reference to

the possibility of a reduction [? production] of a specific antibody, but as serving to explain many obscure phenomena in exceptional cases." The author's own feeling is that scientific investigation is required at the present time and that a crusade is unnecessary.

R. T. L.

SAWYER (W. A.). **Hookworm in Australia.**—*Med. Jl. Australia.* 1921. Feb. 19. 8th Year. No. 8. pp. 148–150.

It appears that hookworm infection in Australia is serious but not very widespread, being confined principally to irregular areas with fairly sharp boundaries which are chiefly determined by the amount of rainfall. Its control will depend principally on the prevention of soil pollution. There is an area of high prevalence throughout the region of high rainfall, extending from Cooktown to Ingham, between the coastal ranges and the sea. From Townsville to Bowen the rainfall and infection rate are low. Between Proserpine and Mackay the annual rainfall and infection are again high. Around Nambour and Landsborough we find another area of high rainfall and considerable infection. There is a similar area on both sides of the border between Queensland and New South Wales. It is expected that most of the interior of Queensland will be found to be free. In Papua the natives on the plantations are highly infected. The mines in Australia, so far examined, are uninfected, but the information about those located near heavily infected surface areas is scanty.

R. T. L.

MIYAGAWA (Yoneji). **Ueber den Wanderungsweg der *Ankylostoma duodenale* innerhalb des Wirtes bei Oralinfektion und ueber ihren Hauptinfektionsmodus.** [The Migration Track of *A. duodenale* within the Host in Oral Infection and the Mode of Infection through the Skin.]—*Mitt. a. d. Med. Fak. d. Kais. Univ. Tokyo.* 1916. Vol. 15. No. 3. pp. 411–452. With 8 plates. [Received July 26, 1921.]

The optimum temperature for the development of ankylostome eggs is 30° C. Sunshine is not only unnecessary, but actually harmful; oxygen and a certain degree of dampness are essential. The eggs are easily destroyed if left in putrid fæces. The following was found to be the best method of culture:—In a large petri dish containing culture medium a small dish containing a little water is placed; in 10, 20 or 30 days the larvæ collect in this small dish. The cultural method was found the best for diagnosing ankylostomiasis; *Ankylostoma caninum* larvæ were used. Oral infection takes place but much less frequently than cutaneous. The larval migrations are complicated—some of the larvæ introduced *per os* bore through the œsophageal and stomach walls and are carried by the blood stream to the right heart and so to the lungs, creeping thence by the bronchi, trachea, larynx and pharynx, and again via the œsophagus to the intestine. This happens also in cutaneous infection. Possibly some pass from the lung to the left side of the heart and then via the blood stream to the digestive tract. The first stage in development takes place in the lung; travelled larvæ withstand chemicals and digestive juices much better than the untravelled. The occasional larvæ found in the submucosa cannot all be accidental, but are possibly the larvæ which reach the intestine via the blood stream.

Encysted larvae withstand digestive juices better than young larvae, while larvae which have passed through the lungs are the least susceptible of all. The author is convinced that the principal mode of infection by ankylostomes is through the skin and not through the mouth. He has demonstrated the prophylactic value of lime spread over fields.

R. T. L.

GOODEY (T.). **A Simple Method of Experimentation for Skin Infection with Hookworm Larvae.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.) 1922. Feb. Vol. 15. No. 4. pp. 19–20.

The skin from the abdomen of a young mouse is pinned on to a sheet of cork about $\frac{3}{16}$in. in thickness. In the centre of the cork is a hole $\frac{1}{2}$ in. in diameter. The cork raft with the attached skin is then floated on the surface of normal saline at 37° C. in a suitable containing vessel, care being taken to ensure that the saline comes into actual contact with the under surface of the skin. The vessel with the floating raft is now placed on the stage of a binocular dissecting microscope and a drop of water containing the ensheathed metamorphosed larvae of the hookworm is placed on the upper surface of the skin. The larvae can be seen wriggling downwards with their anterior ends pressing against the skin as though trying to pierce it. When the preparation has been left exposed for some little time to allow the drop to evaporate the larvae eventually break out of their sheaths and penetrate the skin. By fixing the preparation with hot alcohol an excellent mount can be obtained showing the larvae in the skin and the empty sheaths on the surface.

R. T. L.

KHALIL (M.). **Thermotropism in Ankylostome Larvae.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.) 1922. Feb. Vol. 15. No. 4. pp. 16–18.

The metamorphosed larvae of ankylostoma show active wriggling movements between 20° and 30° C., but accomplish little change of position. If a heated point is applied to the containing vessel they invariably travel directly towards the source of heat. When a large number of larvae are used the process can be watched with the naked eye as a wriggling opalescent mass which disperses gradually after the hot point is removed and collects again when it is reapplied. This phenomenon occurs with the larvae of certain other nematodes, but not with all. It would appear to be a characteristic of skin penetrators, and may become a useful test by which these can be readily distinguished.

R. T. L.

VEVERS (G. M.). **On Some Developmental Stages of** *Ancylostoma ceylanicum*, **Looss, 1911.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.) 1921. June. Vol. 14. No. 8. pp. 25–27. With 4 figs.

Kittens were experimentally infected from a culture obtained from the faeces of a clouded leopard and the various stages of development of the growing worms were recovered *post mortem*. On their way

from the skin to their final habitat in the intestine these worms undergo two ecdyses. Clear illustrations of the various stages are given. The last change, resulting in the appearance of adult characteristics, appears to take place on or about the tenth day after infection. Eggs do not appear in the faeces until about the fortieth day.

R. T. L.

WILLIS (H. Hastings). **A Simple Levitation Method for the Detection of Hookworm Ova.**—*Med. Jl. Australia.* 1921. Oct. 29. 8th year. Vol. 2. No. 18. pp. 375–376.

The method found most suitable and reliable for the detection of hookworm ova is based on the well-known facts that the eggs (*a*) will float in a salt solution of about 1,130 specific gravity, and (*b*) will adhere to a glass surface with which they come into contact [PEPPER, 1908]. The container used by the author measured 3·3 cm. in diameter by 0·8 cm. in height; it was filled about one-sixth full of faeces to be examined, and to this the salt solution was added gradually, the whole being thoroughly mixed. The container was then filled to the brim with solution. After a few minutes a glass slide was placed in contact with the surface of the liquid, allowed to remain a short time, and then examined. Usually two slides were prepared from each specimen. Records showed that this method gave a higher percentage of positive results than either the smear or centrifuge methods or their combination.

R. T. L.

BRUG (S. L.). **De methode van Baermann toegepast op het onderzoek der faeces op mijnwormeieren.** [Baermann's Method applied to the Search for Hookworm Eggs in Faeces.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 5. pp. 565–573.

After allowing the larvae to develop in the stool by leaving the samples spread out in a petri plate for two days, the author puts the faeces in a piece of folded gauze, which is hung up in a sedimenting glass full of water (BAERMANN's method; see this *Bulletin*, Vol. 12, p. 181). After four hours the larvae have slipped out and dropped to the bottom of the glass, where they may be collected with a pipette and counted under a microscope. The differential marks for anguillula (strongyloides) and ancylostoma larvae are given. The author considers the thick chitin wall round the oral cavity of the ancylostoma larva to be most important. Out of 100 samples of faeces 72 (in the original by mistake 62) seemed negative when examined directly, 15 of these giving positive results by the sedimenting test. The author claims that this method also may save time when making examinations in mass.

W. J. Bais.

BREINL (A.). **On the "Arneth Count" in Hookworm-Infected White Children in North Queensland.**—*Ann. Trop. Med. & Parasit.* 1921. Apr. 27. Vol. 15. No. 1. pp. 49–52.

On a previous occasion a shift of the Arneth index to the left was found in healthy aboriginal children of North Queensland analogous to that of children of European descent in North Queensland, but a much more pronounced shift was found in the native children of New

Guinea. Recently opportunities occurred for examining blood-smears from white children in North Queensland suffering from ankylostomiasis and living in an area where malaria is practically unknown. Any definite change must be attributable to hookworm infection. The total averages prove conclusively that the average Arneth index in hookworm-infected children shows a decided shift to the left. A comparison with the Arneth index of New Guinea children shows a striking similarity and strengthens the assumption that the comparative increase in the latter was due to the great incidence of latent and active infections in children, amongst whom hook-worm is probably widespread.

R. T. L.

LEGER (Marcel). **A propos de** *Necator americanus*, **Stiles, 1902.**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 159–161.

Attention is drawn to a thesis dated Montpellier, 1868, by L. CAMUSET, and entitled "De l'anémie tropicale observée à la Guyane française." In this CAMUSET shows that MARÉCHAL had recognized that the hookworm found in South America was distinct from *Ancylostoma duodenale* and had indicated clearly the differential characters.

R. T. L.

ROUSSEAU (L.). *Ankylostomum duodenale* **Dubini 1843 existe en Guyane française à côté de** *Necator americanus* **W. Stiles 1902.**—*Bull. Soc. Path. Exot.* 1921. Feb. 9. Vol. 14. No. 2. pp. 89–91.

The author has recovered both species of hookworms from the stools of two cases which had apparently acquired the infections in French Guiana.

R. T. L.

DARLING (S. T.) & SMILLIE (W. G.). **Studies on Hookworm Infection in Brazil. First Paper.**—*Monographs of the Rockefeller Institute for Medical Research.* 1921. Feb. 1. No. 14. 41 pp.

With an index of infection based upon the number of worms removed by a test treatment of 3 cc. of chenopodium, the incidence of hookworm was estimated in 12 widely scattered localities of Brazil, and was found to average 136·1 worms per case. Almost no individual over eight years of age is free. Infection with *Ancylostoma duodenale* was found in every district, but was very light compared with that due to *Necator americanus*, and increased in places with a changing population and much immigration. Several problems of general interest in relation to improved methods of treatment were studied. It was found that the microscope was of doubtful value in the preliminary diagnosis. It does not yield an absolute index of the presence or absence of the parasites, and is of little value as an index of cure. Individuals in a community with an average infection of 200 worms each, who have received two routine treatments with chenopodium, still harbour an average of six worms each. Since their presence is of no material importance to the individual, the futility of tertiary and further treatments is apparent. Two routine chenopodium treatments in places of moderate infection removed more than 95 per cent.

of the hookworms harboured. In very heavily infected areas, with an average of more than 250 worms per case, a third chenopodium treatment is advisable. Betanaphthol in doses of 6 gm. daily for three successive days removes 96·4 per cent. of the worms. It is more difficult and more expensive to administer in the field. It does not remove Ascaris, and there is greater danger of serious intoxication. Five different combinations of chenopodium administration have been found quite satisfactory. They are in order of relative efficiency :—

1. Undivided 2 cc. dose followed in two hours by a saline purge. A preliminary purge was used.
2. 1½ cc. divided into three equal doses given one hour apart, the last capsule followed in two hours by a purge. A preliminary purge was given.
3. 1½ cc. divided into two doses of 0·75 cc. each and given two hours apart, the last followed in two hours by a purge. *No* preliminary purge was given.
4. 2 cc. undivided dose followed in two hours by a purge. *No* preliminary purge was given.
5. 1½ cc. divided into two doses of 0·75 cc. each and given two hours apart, followed in two hours by a purge. A preliminary purge was given.

The preliminary purge in one and two is an important item of additional expense in field treatment. Method 1 is the method of preference under ideal hospital or dispensary conditions. Method 3 is the method of choice for field treatment. The toxic symptoms produced by the five methods are about equal, though there are always slightly more toxic manifestations when a preliminary purge is given. 3 cc. is the maximum dose of chenopodium for adults and 1½ cc. for children between 8–12 years old, and should never be given in routine field treatment. The dosage should never be measured by the "drop method," as this oil may vary between 18 and 70 drops to the cubic centimetre.

R. T. L.

DE CARVALHO (Aurelio Teixeira). **A lucta contra a ancylostomose no primeiro districto sanitario de Santos (particularmente no Morro de S. Bento).** [The Campaign against Ankylostomiasis in the First Sanitary District of Santos, particularly on S. Bento Hill.]—*Serviço Sanit. Estado São Paulo.* 1920. N.S. No. 20. 27 pp. With 18 plates.

The report deals almost exclusively with S. Bento hill, a district with a population of 954, housed in 162 dwellings, and in very high percentage illiterate and living under very insanitary conditions. The period covered by the report is March, 1917–October, 1919. The campaign comprised (*a*) introduction of sanitary reforms to protect soil and water from infection by hookworm, and (*b*) treatment of all cases presenting clinical symptoms of ankylostomiasis. No detailed figures are given. Of drugs commonly used preference was given to naphthol B., not only because of its proved efficacy, harmlessness and facility of administration, but also because of its comparatively moderate price. Thymol was not used, partly because of the greater care required in its administration and partly because the unpleasant symptoms it causes would have endangered the whole campaign. Its price, too, would have been a heavy burden. Oil of chenopodium was rejected because, apart from its being dearer than naphthol B., its toxicity rendered its use

inadvisable, seeing that a single disaster would have been fatal to the work, exploited as it would have been by pamphleteers and the discontented. The author regards with some reserve the enthusiasm now prevailing for chenopodium, a drug which, in his experience, is a good vermicide with an almost elective action on Ascaris, but, as against ankylostoma, of inferior efficacy to naphthol B., more difficult to administer and with a bad record as regards toxicity.

F. S. Arnold.

DARLING (Samuel T.) & SMILLIE (Wilson G.). **The Technic of Chenopodium Administration in Hookworm Disease.**—*Jl. Amer. Med Assoc.* 1921. Feb. 12. Vol. 76. No. 7. pp. 419–420.

In the present paper the authors record the results of their studies on the influence of various factors on the efficiency of chenopodium administration. A trial treatment of 1·5 cc. in divided dosage is followed by a test treatment of 3 cc. ten days later to remove all remaining hookworms and a comparison of the results of the two treatments is made. The conclusions drawn from the details of the experiments recorded in the paper are : –(1) a preliminary purge does not add to the efficiency of the chenopodium when the drug is given in two doses, 1·5 cc. being considered the adult dose. (2) A preliminary starvation period is not necessary, in fact the efficiency of the chenopodium treatment is lessened. (3) A small amount of food given coincidently with the divided doses greatly diminishes the efficiency of the chenopodium (4) In the smaller doses that are given to children the decrease in efficiency of chenopodium caused by the factors of preliminary purge, starvation period, and food is much more striking than in the full adult dosage of 1·5 cc.

R. T. L.

MCVAIL (J. Borland). **The Present Position with Regard to the Treatment of Ankylostomiasis.**—*Indian Med. Gaz.* 1921. Sept. Vol. 56. No. 9. pp. 324–325.

The results of recent research would appear to the author to narrow the field of choice of anthelmintic in hookworm campaigns to thymol and oil of chenopodium. Before the war thymol was imported from Austria, but to-day an entirely satisfactory product is being made in India by steam distillation from ajowan seeds. The author considers that thymol should under no circumstances be chosen for treatment unless the physician is sure that certain precautions will be carried out. From the time of the first purge until the second has acted, no oil, ghee, fats of any sort, and particularly no alcohol must be consumed, no food must be taken and only the minimum amount of drinking water. While thymol is acting the patient must stay in bed. The patient should be seriously warned against taking alcohol to relieve the sinking feeling caused by purgation and starvation. The dose of chenopodium should be measured with a hypodermic syringe and the required quantity squirted into a hard gelatin capsule. If any toxic symptoms appear a purge of magnesium sulphate should be given immediately. Starvation and purges are unnecessary. No consignment of chenopodium should be used freely without previous careful clinical trial. There are some grounds for believing that in cases of kala azar complicated with ankylostomiasis it is better to treat the kala azar first.

R. T. L.

CAIUS (J. F.) & MHASKAR (K. S.). **The Correlation between the Chemical Composition of Anthelmintics and their Therapeutic Values in Connection with the Hookworm Inquiry in the Madras Presidency. vi. Oleum terebinthinae. vii. Oleum eucalypti. viii. Chloroform. ix. The Eucalyptus-Chloroform Mixture. x. Betanaphthol. xi. Extractum filicis liquidum. xii. Kousso. xiii. Kamala. xiv. Pulvis arecae.**—*Indian Jl. Med. Res.* 1920. July. Vol. 8. No. 1. pp. 125–130; Oct. No. 2. pp. 372–378; 379–383; 384–394; 1921. July. Vol. 9. No. 1. pp. 33–55; Oct. No. 2. pp. 191–197; 198–201; 202–205; 206–209.

vi. *Oleum terebinthinae.*—In a series of 79 cases of hookworm treated with varying dosages of oil of turpentine, 11 out of a total of 1,316 hookworms were removed. No ascarids were expelled, though subsequently found in 25 cases. Similarly 16 cases of whipworm infection were unaffected.

vii. *Oleum eucalypti.*—Oil of eucalyptus is distilled from the fresh leaves of various species of Eucalyptus, the most important being *E. globulus* on account of its high eucalpytol content. Test treatments conducted by the authors confirm the conclusions of DARLING, BARBER and HACKER that eucalyptus oil is ineffective for the removal of hookworms and other intestinal worms. That it is a very weak vermicide may easily be gathered from the large number of worms which are expelled alive and the need of a strong purgative to remove them before they have time to recover from the drug. Pure eucalyptol ought to be used preferably to the oil itself but cannot be recommended for the eradication of hookworm infection.

viii. *Chloroform.*—Pure chloroform is decidedly effective as an anthelmintic agent against hookworms and is particularly potent against ankylostoma. Within the limits of 30 40 minims as a dose it has little effect on roundworms and has none against the whipworm. Most of the worms are expelled alive. The chloroform is evidently not a vermicide nor is it a vermifuge. It is essentially an anaesthetic and acts as such on the parasites. A vigorous purge is therefore necessary to sweep out the worms before they have time to recover from the stupefying effect of the drug. The authors' experience is, however, that chloroform is an unpleasant drug to handle even in the smaller doses of 45 minims advised. Toxic symptoms are occasionally noticed even with a dose of 30 minims. The after-effects of chloroform medication are *nil*. The conclusions stated are: (1) pure chloroform *in combination with castor oil* ranks high as an anthelminthic against hookworm; (2) provided hospital conditions are possible the chloroform treatment recommends itself wherever ankylostome infection prevails.

ix. *Eucalyptus Chloroform Mixture.*—HERMANN was the first to use this mixture, which has since passed under a variety of names. From the experimental data detailed in this paper it is evident that chloroform in this mixture alone has an anthelminthic value and that eucalyptus is superfluous and may be dispensed with altogether. The suppression of the eucalyptus would lessen its toxicity, reduce its cost and facilitate its administration. The mixture is a very weak vermicide as the toxic and anthelminthic effects reside in the anaesthetic property of the chloroform. As a strong purge is essential to expel the anaesthesized worms, the castor oil is an essential part of the mixture. There will always subsist an element of doubt as to both the safety and the efficacy of this treatment.

x. *Betanaphthol.*—Betanaphthol is a solid drug of constant composition easily obtainable in the pure state and does not deteriorate with age. It is a powerful vermicide on Ankylostomes and Necators, and in sufficiently large doses is an effective ascaricide. It is a safe drug up to 60 grains dosage. No after-purge is required. Dose for dose it is safer and more efficient than thymol. Up to a dosage of 40 grains advantage lies with a single portion treatment; beyond 40 grains the drug may indifferently be given in one, two, or three portions. Fifty grains may be taken as the optimum dosage and 60 grains as the maximum for adults. The drug has a vermifugal action promoting physiological evacuation of the bowels. The cases of haemoglobinuria and all the fatal cases recorded in literature followed upon either the administration of a dose higher than 60 grains, or, more frequently, upon continual administration for several successive days. Ankylostoma is more resistant to this drug than Necator. The drug is absorbed and is eliminated by the kidneys. The absorption is relatively slow, while elimination is rapid, never extending beyond 24 hours after treatment.

xi. *Extractum filicis liquidum.* The rhizome of male fern has been a favourite anthelminthic since the times of THEOPHRASTUS, DIOSCORIDES, PLINY and GALEN. It seems to have been administered generally in 36 grain doses. The extract is a thick, dark-green oily liquid obtained by exhausting with ether the powdered rhizome. So far there is no consensus of opinion either as regards the chemical nature of the different constituents or their respective therapeutic values. The active principles readily deteriorate. Only two active principles, filicin and filmaron, need be taken into consideration. These are both neurotoxic and myotoxic poisons. Ninety minims is the admissible dose. In a series of 51 cases treated, 38 hookworms out of a total of 1,285 were removed. The worms were dead when expelled. No ascarids were removed, though present in 14 cases. No tapeworms were passed in six infected cases. The authors conclude that extract of male fern cannot be recommended as an anthelminthic.

xii. *Kousso.*—Extracts of dried female flowers of *Brayera anthelmintica* have long been used as a taenicide. Of the cases treated by the authors, one who had received 3½ drachms of the drug passed 33 hookworms out of a total of 38. In 12 cases treated with doses ranging from 2 to 5½ drachms only 2 out of a total of 86 hookworms were removed. Neither roundworms nor whipworms were removed though seven cases of the former and two of the latter were treated. Kousso cannot be recommended as an anthelminthic.

xiii. *Kamala.*—Kamala consists of the minute glands and hairs which cover the capsules of *Mallotus philippinensis*, a small evergreen tree found throughout tropical India. The authors' results show that kamala cannot be recommended as an anthelminthic. In a series of seven cases treated with doses ranging from 1 to 2½ drachms given in one portion without any purge only one hookworm out of a total of 407 was removed No worms were removed, though three cases proved to harbour ascarids and five cases whipworms.

xiv. *Pulvis arecae.*—The areca or betel-nut palm is widely cultivated in tropical countries of the Far East, where the nuts mixed with lime and betel pepper form the well-known masticatory. In China and

India the ground areca nut is used as an anthelminthic. It is also considered to be a powerful astringent which tends to counteract the relaxation of the bowels, to which the heat of a tropical climate so strongly predisposes. The authors cannot recommend Pulvis arecae as an anthelminthic. In a series of 10 cases *no* hookworm was removed, though subsequently 232 Necators and 9 Ankylostomes were recovered. No worm was expelled from two cases of roundworm and two of whipworm. The dose given was four drachms of ground dried nut without previous preparation of the patient.

R. T. L.

i. Lellis (Areobaldo). **O chenopodio e a sua toxidez.** [On Chenopodium and its Toxicity.]—*Brazil Medico.* 1921. July 9. Year 35. Vol. 1. No. 28. pp. 358–360.

ii. de Almeida (Junior) (Theophilo). **O chenopodio e a sua toxidez.** —*Ibid.* Sept. 17. Vol. 2. No. 10. pp. 132–134.

i. The author states it as his opinion, based on an extensive experience of ankylostomiasis and its treatment in the hospital of Santa Casa de Misericordia at Victoria (Brazil), that the reputation for toxicity attaching to chenopodium is due to its routine association with chloroform in administration. He states that since he has abandoned the practice of giving chloroform with chenopodium, and has given the latter drug alone, he has observed no toxic symptoms whatever, even with large doses and in cases in which the effect of purgatives was delayed, so that full time was given for any toxic symptoms due to the chenopodium to show themselves. The author further states that he has found entirely unnecessary the rigid dietary regulations generally laid down for patients under treatment by chenopodium *so long as the drug is given by itself.*

ii. The author dissents *in toto* from the theory of Lellis, and cites two cases in which doses of chenopodium within the generally accepted limit of safety for age, administered without chloroform to children of two and three years respectively, were followed by fatal collapse.

F. S. Arnold.

Baermann (G.). **Ueber Ankylostomiasis, deren Ausbreitungsbedingungen durch die Bodeninfection und deren Bakaempfung.** [The Conditions of Spread of Ankylostomiasis by Ground Infection and its Control.]—*Geneesk. Tijdschr. v. Nederl-Indië.* 1917. Vol. 57. No. 5. pp. 579–669. With plate, charts and plans.

The most important addition to knowledge in this long and interesting paper, which has unfortunately hitherto escaped notice, is the discovery that under the conditions therein described ankylostome larvae harbouring in the soil are not diffused over wide areas but are concentrated in the neighbourhood of latrines and in the constantly damp soil around vessels where water is stored and frequently spilt by the natives, especially within buildings. This discovery, based on a novel method of detecting the larvae in soil samples, devised by the author, has enabled him to take precautions against these sites of maximum infestation, and so against reinfection after mass cures.

The plantations on the East Coast of Sumatra are worked mainly by Javanese and Chinese coolies on long term contracts. They live in large common dwellings, housing 50 to 500 each, called pondoks, and it is to their conditions that the author's studies refer.

The curative measures and soil prophylaxis hitherto practised have reduced the density of infection greatly, but have failed to eradicate it. Only constant attention and renewed efforts keep the disease within certain bounds.

The author details the measures taken to protect the soil from infection.—An area 25 to 30 metres wide round the pondoks is cleared and kept free from soil, and any trees which stand too near are cut down. The latrines are made 20 ft. deep and conical downwards; the depth lessens the smell and makes frequent filling of the hole, and therefore change of site, unnecessary. The excavation is covered with strong planks in which 1 ft. square holes are cut. Walls and roof consist of corrugated iron, wood or atap. The planks are thoroughly cleansed with water daily and with a disinfectant every eight or ten days. The latrine is placed as near as possible to the pondok, in any case within the 25 metres area. The author says that if the latrines are suitably built, well ventilated, kept constantly clean and as free from smell as possible, most Javanese will readily use them. European supervision is, of course, necessary. In ten years the mortality on these estates has been reduced from 40 per mille to 4, a saving, according to the author, of 342,000 guilders, apart from increased production, and this nearly equalled the cost of the hospitals. He notes that in one year, 1911–12, no sanitary prophylaxis was carried out and that the mortality rose to 34 per mille. Naturally other diseases were being combated at the same time, but ankylostomiasis is by far the most important. Synchronously with the ten-fold reduction in mortality has occurred a ten-fold increase in living births on these estates, which in a thinly populated country is of real importance.

The result of these measures—curative and sanitary—practised for ten years was that 80 per cent. of the coolies at any time were useful workmen, with light infections, that fresh light infections and reinfections were frequently occurring, and a percentage of severe infections of 1 to 1·5. It was obvious, therefore, that somewhere the anti-hookworm measures were defective, and it was necessary to decide whether the drugs used were wanting in efficacy, or frequent opportunities for local infection were occurring. In the discussion of the latter alternative lies the chief interest of the paper.

The author has shown that ankylostome larvae wander from earth into water, moving in loose earth at the rate of 1 cm. per minute; that from loose earth all have gone in 24 hours, and most after the first half-hour; that many more move downwards than move upwards; that the mixing with water and breaking up of lumps of earth expedite their removal [see this *Bulletin*, Vol. 12, p. 181]. A series of experiments was now made, lasting six months, to determine the effect of moisture and drought, sun and shade, on the persistence of the larvae in earth. Boxes containing one-eighth of a cubic metre of soil were used, on the surface of which an infected stool was spread. Some were first planted with grass or low shrubs. It was found that planted soil afforded very favourable conditions for the development and month-long persistence of larvae. In unplanted soil the larvae did not develop when exposed to sun with little rain; they did so when rain was abundant, but soon died off again in drought. A network of roots or a little grass was sufficient to retain the necessary moisture. Shade was always a favourable factor. The larvae were not found

on the surface, but close beneath it and at greater depths. It is readily seen that in wet ground the weight of the foot will open up the soil sufficiently to give the larvae a chance to reach the skin; infested particles of earth will be carried away on the feet and thus allow the larvae time to penetrate. Other kinds of nematodes and nematode larvae are found also, but the ankylostomes can be recognized with or without their sheaths, for these are often shed.

To get an idea of the possibilities of ground infection, the author investigated by his special method the 24 hours' stool of a heavily infected untreated woman a day before her death. In the first four hours, 866,800 larvae made their way into the water, and after four days a total of 1,141,600. The stool weighed about 100 gm. After death the worms in the gut were carefully counted and numbered 1,986, of which 1,102 were females, which gives 1,036 germinable eggs for each per day. A large number of counts gave a proportion of 60 females to 40 males, and of 50,000 worms 92 per cent. were Necator and 8 per cent. Ancylostoma. The cases from which these figures were taken were hospital cases. To get comparative figures from an estate with favourable hygienic conditions, the author took into hospital the inhabitants of two pondoks, 130 persons in all. The average number of worms obtained from them after treatment was 86. A series of persons from another pondok gave an average of 225 worms. From these and other figures it is calculated that for every coolie there may be 68 female worms, capable of producing daily over seven million viable eggs.

The author was now ready to investigate samples of soil for larvae. He uses a funnel, to which is attached an india-rubber tube clipped below. This is filled with water, and into it is fitted a sieve of brass, with meshes 1 mm. wide, in such a way that it dips 2–2½ cm. below the water surface. In the sieve is placed a coarse-meshed cloth, upon which the soil, broken up and stirred with water, is laid. This is to avoid the difficulty of cleaning the sieve, the cloth retaining all, or nearly all, the soil. The complete apparatus can be cleaned and boiled after each use. The larvae make their way into the water in the funnel and tubing. After 24 hours the 40 cc. of water is drawn off into a wide test tube, allowed to settle, the supernatant fluid poured away, and the few drops at the bottom are examined on a slide. This will always contain other kinds of larvae, and for ready differentiation 7·5 per cent. caustic potash is added, one drop to five drops of the fluid. All unsheathed larvae are rendered immobile, while the ankylostomes are unaffected. In every case, for assurance, the oesophagus, oral opening, genital cell and excretory pore are scrutinized. The diagnostic points are discussed.

The information thus obtained was now applied to the investigation of the estates, samples of earth being taken from various points which are indicated on plans. It was thus found that in all latrines, even the best constructed and the cleanest, ankylostomes could be found in the immediate surroundings, and the bad latrines were a great danger, because the users carry away particles of faeces on their feet into the sleeping rooms and neighbourhood of the pondoks. Even on estates with good latrines reinfection of some coolies was constant, and observations of the kind are well illustrated in the table.

Relapse treatments in coolies treated two, three, four, five and six months before, to the complete or almost complete eradication of their worms.						Relapse treatments in persons who had been thoroughly treated in hospital 1 to 2 years before.	
	Two months.	Three months.	Four months.	Five months.	Six months.		
	3	0	0	0	0	652	Worms expelled.
	4	0	3	2	3	568	
	9	2	14	7	10	1,318	
	18	9	17	19	14	1,097	
	48	16	25	25	34	334	
	78	26	34	33	191	1,493	
	164	30	38	43	329	1,210	
	—	48	56	55	486	586	
	—	53	72	92	581	204	
	—	144	78	96	—	768	
	—	320	92	259	—	461	
	—	—	94	—	—	2,069	
	—	—	98	—	—	628	
	—	—	99	—	—	756	
	—	—	99	—	—	491	
	—	—	104	—	—	378	
	—	—	159	—	—	294	
	—	—	160	—	—	534	
	—	—	178	—	—	208	
	—	—	341	—	—	328	
	—		—	—	—	1,047	
Total worms expelled ..	324	648	1,761	631	1,648	15,442	
Average ..	46	59	88	57	183	738	
Index of Infection per die ..	0·75	0·65	0·72	0·4	1·0	1·3	

It is noted that the coolies who furnished the figures for two to six months were selected without reference to symptoms.

It was concluded from these figures that infection must be occurring either in the places where the coolies work or in their houses or the surroundings of these. It is only the tappers who work continually over the same ground; investigations of such ground were made in the case of some who were heavily infected, but with negative result. Attention was therefore turned to the pondoks. These stand either directly on the ground or raised 1–3 ft. on boards, the so-called "lante." Some have a verandah 3–6 ft. wide, the so-called "kaki limah," on which the coolies spend much of their time. Larvae were found in the ground of all the living rooms of heavily infested coolies, and almost exclusively in the water places. Behind the door the coolie is accustomed to keep a petroleum tin, or barrel of drinking or washing water, especially for the night. Whenever water is spilt, and this constantly occurs, conditions are favourable for larval development, and here the larvae are found in great numbers. The author suggests that they are brought on the coolies' feet either from the latrines or from other places where they defaecate. He notes also that after defaecation the native washes the anal region and usually at his house. Infection of the room cannot occur if the pondok

is on a lante, but, unfortunately, in this case the water supply is frequently kept on the kaki limah. In the case of the lante, particles of stool may be washed through the boards and development go on in the space underneath, which is frequently used for various purposes, and is therefore trodden by the coolies. The lante pondoks are preferable to those on the ground, and estates with the former usually show less severe infections, partly owing to the fact that the sun reaches the kaki limah, but not the interiors.

A further proof of the importance of "room infection" is its severity in the women as compared with the men. In the figures for three years the severely infected men average 0·9 per cent. of the force, the severely infected women 2·6 per cent. The women spend a longer time in the rooms over household work, which demands the use of water. Unmarried men, who have to do their own housework, often have as high infections as the women. Children are seldom found infected before the age of five; at first they are carried and they do not use the latrines. Heavily infected couples rarely have children; the mothers abort.

Water barrels are also found in or near the kitchens, and here also infections occur. The larvae-infested ground need not be wet on the surface; it is frequently dry, but the layers below are damp. As a rule the larvae are in the upper five centimetres. Ground that is always freely exposed to the sun is always negative. The chief source of infection is filthy latrines. If they cease to be used, shady damp places are selected by the coolies, and in their turn become dangerous foci. A number of illustrative cases are given, with sketches of estates and the buildings thereon.

The author compares his figures with the much lighter figures of Schüffner, whose work was also done on the east coast of Sumatra. The differences are due to the fact that Schuffner's coolies were workers on a tobacco plantation and were Chinese. The tobacco coolies change their place of work, so that severe reinfections are almost excluded, and the older Chinese dig their own latrines and use them. When Chinese work on rubber plantations they get heavy infections, like the Javanese. When former contract labourers, heavily infected with ankylostomes, go to live in native villages they frequently by degrees lose their infections. One such village is described, in which the inhabitants gave low or negative results, and the findings in the latrines and houses were also negative. Each house had its own latrine—it was usually on a lante—and the surroundings were kept quite clean. A Chinese village is described, very dirty with damp surroundings, without separate latrines, but with a common latrine on piles over a stream; the inhabitants wore wooden clogs, and the rate of infection was low.

In the conclusions to this part of the report the author insists on the importance of the concentration of the population and of their faeces in producing the heavy infestations which he has described. Even then time is needed, and for such a condition to develop on a new estate takes four years, though the average Javanese brings with him an infection of 131 worms per man; 700 worms at least are needed to produce severe symptoms. In free natives the infestations are very seldom severe.

A simple solution for the rubber estates would be separate houses for the coolies, but this, for various reasons, is impracticable. Similarly with the wearing of shoes: the author reckons this would cost, for 20,000 coolies, 100,000 florins yearly, and their wear could not be assured in the most important place—within the pondok. Without moisture the larvae do not develop, and the obvious course is to remove the water stored in and round the pondok. This, however, is impracticable. If the water were removed the coolie would find other means and ways of bringing it in, and

were the prohibition insisted on he would seek employment on other estates in which the rules were less rigid. The water places may, however, be reduced in number, and those that remain may be made less dangerous.

The author has made experiments on the disinfection of these circumscribed areas, which he proceeds to relate. The substances tried, with more or less success, were lysol, izal, hycol, Jeyes' fluid, carbolineum and crude creolin. Some 50 larvae, about 14 days old, were placed in 2 cc. of various strengths of the disinfectants and observed under the microscope at intervals of five minutes, and to obtain more accurate results larvae which became immobile were placed in an earth sample to see if they would revive and wander out into water. Such revival did indeed take place. The best disinfectants for the purpose were izal and hycol. The experiments were then repeated with samples of one-eighth cubic metre of earth to which larvae had been added in great quantities, and it was shown that 10 litres of a 2½ per cent. solution of izal would almost completely sterilize one-eighth cubic metre of soil. Other experiments were made with boiling water, it having been shown that ankylostome larvae die at 50° C.; it was found to be effective in quantities of 10 and 15 litres. Lastly, the two methods were combined. The experiments were applied thus: the damp earth in the rooms at the water places was broken up with a spade to a depth of 25 cm. over an area of ½ sq. metre and a petroleum tin of boiling 2 per cent. izal (15-18 litres) was poured over it. The procedure was similar at the water places on the kaki limah and in the kitchens. This is repeated every six months or oftener, or boiling water can be used once a month.

A disinfection brigade is recommended, to consist of a native overseer and two men, acting under the direction of the medical officer. The brigade is supplied with kettles, watering cans, disinfectants, and the like. The water vessels are removed from the living rooms and kitchens and placed on a cemented kaki limah. The space under the lante is closed by barbed wire or otherwise. The cook houses also are cemented, as are all water channels in or near the pondok. The latrine is connected with the pondok by a covered way and is lighted at night. Its floor is constructed of stone and cement and sheet-iron or sheet zinc, so that with sufficient use of water there is no fouling. Full details of the best construction are given. The manager and his assistants must be well instructed in the prophylactic measures and the reasons for them.

A. G B.

MHASKAR (K. S.). **Hookworm Infection and Sanitation.**—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 398–406.

The sanitary conditions of Trichinopoly Jail could scarcely be improved upon, and afforded the author a favourable opportunity for determining whether sanitation has any bearing on hookworm infection. He concludes that the incidence of hookworm infestation is not appreciably affected by jail life under the most suitable sanitary conditions because (*a*) the span of life of the worm may extend beyond 16 years; (*b*) improved sanitary conditions do not exclude all possibility of reinfection; (*c*) even on the suppositions of no reinfection and a progressive elimination, all would pass from a higher to a lower degree of infection. That a natural progressive elimination of the worms does take place is illustrated by a series of counts which show that an infection averaging 58 hookworms per case on admission had fallen to 48 per case after one month's stay in jail, and gradually dropped to 32, 29 and 17 worms per case after respectively 3, 12 and 18 months' stay. Beyond 18 months of jail life the number of hookworms remained fairly

constant, and even such a long stay as 17 years does not seem to bring complete sterilization. A table showing the percentage of Ascaris and Trichuris infections at different periods of stay in jail gives evidence that jail life is not favourable for the propagation of either of these infections.

R. T. L.

MAPLESTONE (P. A.). **A Note on the Question of Hookworm in Pigs.** —*Med. Jl. Australia.* 1921. July 9. 8th Year. Vol. 2. No. 2. p. 20.

An examination of 182 pigs in the Townsville district of Queensland gave no indications of infection with hookworm. There is no evidence of practical danger of the spread of ankylostomiasis by pigs in North Queensland.

R. T. L.

LEGG (John) & RHEUBEN (J. A.). **Note on the Finding of** *Anchylostoma duodenale* **in the Intestines of the Pig.**—*Med. Jl. Australia.* 1921. Nov. 5. 8th year. Vol. 2. No. 19. p. 398.

This note records the presence of *Ancylostoma duodenale* in semi-domesticated pigs coming from Cromarty, near Townsville. The diagnosis was made by Dr. Georgina SWEET, of Melbourne University, and confirms a previous find by O'CONNOR, in the Ellice Islands.

R. T. L.

BOOK REVIEWS.

The Practice of Medicine in the Tropics. By Many Authorities. Volume I. Edited by BYAM (W.) [O.B.E.; Lieut.-Colonel, Royal Army Medical Corps (retired); etc.] and ARCHIBALD (R. G.) [D.S.O., M.D.Edin.; Major, Royal Army Medical Corps (retired); Director of the Wellcome Tropical Research Laboratories, Sudan Government, Gordon College, Khartoum; etc.].—xxii + 856 pp. and index. With 35 plates and 334 illustrations in the text. 1921. London: Oxford Medical Publications. Henry Frowde and Hodder & Stoughton. [Price £4. 4s.]

The ancillary and cognate subjects of medical zoology, laboratory technique, hygiene, and toxicology form almost the whole of this big first volume on the Practice of Medicine in the Tropics. This, however, will not appear strange to those who regard the phenomena of tropical disease as taking their particular bent very largely from indigenous social conditions. In the tropics, outside the great municipal centres of European activity, man has not fairly put the jungle under his feet, and lives more at the mercy of his organic environment than by any recognized sanitary standards; and, as a consequence, the medical practitioner from Europe is constantly faced with problems and responsibilities that demand a fuller and more practical acquaintance with medical entomology, and such other subjects as are dealt with in this volume, than is necessary in the more conventional practice of his own country. The volume is composed of five sections, which may be considered individually.

The first section is a treatise, by Dr. Andrew BALFOUR, on personal hygiene and rural sanitation, or, as it is here called, "minor" sanitation. Under the heading of personal hygiene the many details—of food, drink, clothing, exercise, habits, equipment, etc.—bearing upon the maintenance of individual health and well-being in the tropics are discussed. Incidentally, the question of the permanent acclimatization of the white man is impartially considered—a question that some day must become of great importance, even outside Australia. Dr. Balfour seems to keep an open mind on the subject, though he thinks that the balance of evidence is in favour of the affirmative answer given by GORGAS—an opinion which, although it may not be consonant with *a priori* argument, is supported by certain experimental evidence of an unwitting kind, namely, by the history of the "poor whites" of Barbados and Grenada, and by the strange account of the sturdy present-day descendants of the Dutch couples marooned in oblivion in the year 1665 on the island of Kissa, off Timor [*circ.* lat. 10° S.]. The subsection entitled "Minor Tropical Sanitation" is minor only in the sense that big cities and the paraphernalia of the sanitary engineer are not included in its scope. In details it is domestic and rural sanitation with the necessary modifications for climate and other tropical conditions consistently emphasized and carefully worked out. The chapter on habitations is full, but concise: the multifarious points to be considered in the design and construction and protection of a European house and its annexes are all reviewed, certain points to be attended to in constructing native houses are pressed, and contrivances for ensuring the salubrity of encampments are discussed. Nothing, however, is said about hospitals, although it is not an unusual experience for a young medical officer in the tropics to have to choose a site for a small hospital and to give advice about its design. In the excellent chapter on water there is a good deal that may be found in ordinary text books, but simple methods of purification that lie within the competence of the medical officer himself are well described. There is a very full chapter on methods—mainly dry methods—of dealing with excreta; and the author, out of his great experience, is not afraid to

allow that there are very hot and dry tracts where, if there is a good service of scavengers and set bounds are strictly observed, the elaborations of the latrine may be demitted. Very particular attention is given to the prevention and destruction of vermin, particularly flies. The only pages that fall below the high and apposite standard of this section are the few on animal foodstuffs, those on fishes in particular being lean and scrappy. The figures of fishes, too, though artistically fine, are not well chosen; of the eight shown, five (three sea-perches and two clupeoids) are quite like familiar British forms.

A very instructive chapter, by Dr. Malcolm WATSON, on Mosquito Control, which one would expect to find under the general heading of Sanitation—especially as its author, out of the fullness of his experience, pronounces anti-mosquito operations to be the proper business of the sanitary authority—is placed in the section on entomology. The author shows how necessary it is that the "measurement of malaria," by spleen examination and by hospital and mortality statistics, should go hand in hand and keep pace with all anti-mosquito enterprises, since it constantly reveals clues that may lead quickly to definite results. He shows also how essential always is the study of local oecology, since the measures that, in one type of environment, may lead to the disappearance of a dangerous species, may, when applied in another type of environment, help another dangerous species to settle and spread. His remarks, also, on the various methods of mosquito-control are seasoned with experience of their particular applicability and comparative cost. One could wish that something more had been said on the bionomy of Anopheles larvae, and that the subject of host-preferences of the adults had been opened out, as these are matters which have attracted a good deal of attention of late, and are matters about which the author must know a great deal.

An isolated section on Nursing, by Colonel Tull WALSH, might also perhaps have been placed under the general heading of Sanitation. In distant up-country stations nurses cannot be procured, and in cases of serious illness the medical man must be prepared to instruct and encourage a relative or friend of the sick person not only in the duties of the sick-nurse, but possibly also in some of the contributory expediencies of the cook; and in dealing with all the responsibilities of this situation the author is so full and so clear that even a trained nurse might profit by his instructions. Besides care of the patient and amelioration of his environment, the special responsibilities of particular diseases and the care of the infant and the young child are considered. Beyond this, there are pertinent remarks on matters of caste, native susceptibilities, etc., and also on the protection of medical stores and equipment from insects and the deleterious effects of climate—all of which will be found useful by the trained nurse in tropical institutions.

Throughout the Entomology section the contributions are copiously and most artistically illustrated. Here the ticks are dealt with by Mr. C. WARBURTON in 16 pages, with 32 figures in the text; their general characters, superficial structural features, and generic differences are clearly described, and the habits, bionomy, and pathogenic relations of certain species are briefly considered. The bionomy of *Ornithodorus savignyi* is said to be essentially the same as that of *O. moubata*; but the habits of these two species are certainly different, the former in India and E. Africa being active in daytime. The table for identifying the several genera of Ixodidae is admitted to be "rough and ready," and is also not quite safe for the uninitiated.

The blood-sucking lice are undertaken by Dr. Ll. LLOYD, who describes their external and internal structure and their life-history and pathogenic activities very clearly, and goes very thoroughly into methods of disinfestation. Mr. M. MACGREGOR gives a useful account of the bugs and also of the fleas that come within the purview of the sanitarian, always keeping well to the point. He seems to have overlooked that notorious member of the Reduviid family, *Rhodnius prolixus*, and also some of Bacot's more recent papers on the biology of fleas.

The blood-sucking midges are treated in masterly fashion by Mr. H. F. CARTER. The account of the Culicidae is, from the medical standpoint, all that can be desired—alike in design, proportion, and necessary detail; and the keys for identification of the species of Anopheles arranged according to zoo-geographical regions are just what is wanted. The 14 fine coloured plates of notorious species of mosquitoes are a suitable embellishment to the text. It is pleasant to find the ingeniously-named genus *Ramcia* maintained (as distinct from Corethrella), and the familiar name *Anopheles sinensis* upheld against the arbitrary alias "hyrcanus."

The Tabanidae, which are dealt with by Mr. H. H. KING with admirable brevity, are illustrated by numerous appropriate and artistic figures and a very beautiful coloured plate.

Dr. L. O. HOWARD and Mr. W. D. PIERCE are responsible for the important chapter on Diptera noxious to health by methods more subtle and devious than sucking blood. Their treatment of this difficult subject is extremely sound, the pure entomology being properly directed and justly subordinated to its practical bearings and applications. Attention is concentrated on the pertinent species, the more important of which are well figured, and they are treated according to their pathogenic activities in two groups, composed respectively of those that spread pollution and infection, and those that do explicit mischief of the kinds known as myiasis, the latter again being analysed in four groups according to their road of attack and field of parasitic activity. Of those that spread disease, the specific pathogenic associations, actual and potential, are fully catalogued, and the bionomy is briefly considered in relation to preventive and palliative measures. Of the miscellaneous lot of maggots that may get into the alimentary canal a synoptical table is given. One notes with gladness that the generic name Chrysomyia is retained for the screw-worm fly.

The blood-sucking Muscidae are handled by Dr. LLOYD and Major PATTON. Here again the entomological descriptions are abundantly illustrated by clear and artistic figures (including a fine coloured plate of *Glossina palpalis*), and the differential characters of the genera are conveniently summarized in a key. The tsetse flies naturally fill this stage, being considered generally in their biology and taxonomy, and also specifically (as regards the more notorious forms) in their habits, haunts, breeding-places, etc.; some principles of prophylaxis are briefly discussed, but the controversial question of destroying big mammalian hosts is intentionally relegated.

The chapter by Dr. S. A. NEAVE on the making of entomological collections is rather more suitable for a manual for explorers than for a treatise on tropical medicine. As regards its matter there is, of course, little to criticize, except that one may object to killing-bottles containing that nasty hygroscopic substance KCN. and also to the method, when pins are not available, of packing mosquitoes in pill-boxes with *cotton-wool*. It is to the limitations of the matter—for which the author may be assumed to be less responsible—that objection may be taken. What the ordinary medical man more often wants are hints for dealing with things of medical interest that cannot be preserved by any general methods with which he is already familiar—hints, for instance, for making a collection of dry Diptera without pins and entomology forceps and store-boxes. And even more than this, he wants advice about the collection, management and manipulation of living insects, etc., for experimental purposes in the laboratory, and about the dissection and microtomy of insects.

The stated aim of the section on Laboratory Methods is "rather to supply the laboratory worker in the tropics with information that will be of practical value, and also to include methods involving simple technique which may be of assistance to medical men working in 'out stations,' whose armamentarium consists of a microscope, a few slides and cover-glasses, and an equally small selection of stains." The execution of this aim is well entrusted to Major R. G. ARCHIBALD, and in surveying the detailed information furnished by him regarding the equipment of

the laboratory, the care of the microscope and all its adjuncts, the making and staining of films and sections, the properties and uses of a large selection of stains, the examination of the blood in its cellular and other particulars, the examination of faeces, urine, and pathological fluids, the estimation of agglutinins, the investigation of parasitic skin diseases, and all the points to be attended to in a post-mortem examination in the tropics, one would be inclined to think that the aim has been adequately and admirably fulfilled. One cannot but feel, however, that its range has been somewhat strained by the inclusion of serological tests, and exceeded by the inclusion of a large tract concerned with culture media and their preparation. Indeed, at this point the question emerges—and becomes very audible when the long subsection on sera and vaccines opens out—whether these matters, at once so technical in their due performance and so universal in their appeal, come fairly within the scope of a volume dedicated to the *practice of medicine* in the *tropics*. It is not the inherent value of the information here set forth at such length that is questioned, but only its pertinence to and congruence with the avowed title. This section ends with more obviously useful chapters on the transfusion of blood, and on the setting up of an anti-variola-vaccine establishment in the tropics, this last by Dr. A. B. Green.

Majors H. W. Acton and R. Knowles contribute the section on Snakes and Snake-poison. The clear, profound and comprehensive investigations of snake-poison by these distinguished workers have already been noticed briefly in this *Bulletin* (Vol. 9, pp. 237–241). Here the poison-apparatus in all its details, the mechanism of the bite, the estimation of the quantity of venom secreted and available for discharge by different species, the chemistry and toxicology and potency of venoms, the nature and action of anti-venenes—all these and other subsidiary matters are admirably discussed both in themselves and in their practical bearings on symptoms, prognosis and treatment. There are also some sufficient remarks on the general characters of snakes as an order of reptiles. But the authors have done indifferently in appending to their own first-class stuff no less than 29 dreary pages of catalogue, wherein many of the terms of classification are misleading either by their insufficiency of definition or by their want of necessary qualification. This is not the place for discussing the principles of a zoological classification, but at least it may be said that the uninitiated person who attempts to identify a given snake by tables based on superficial characters will often find himself in a desperate dilemma. There can be no doubt, however, as to the impressive value of all the other parts of this section, quite apart from the Indian mortality returns, which the authors quote without comment. As regards these returns, which give the annual number of deaths from snake-bite as between 20,000 and 25,000, it must be remembered that for rural India they are avouched in the first instance by the village "chaukidar," or watchman, recently touched off by Colonel Walton as "an ignorant rustic, who arranges his figures in accordance with local expediency rather than with the facts, even as he interprets them." It must also be borne in mind that since in Hindu estimation the cobra is a divinity, death from snake-bite is accounted honourable, and, of course, *reflects* honour. In this section the coloured plates, which represent only Oriental species, are not very good.

The final section on Toxicology contains a mixed chapter on vegetable poisons and poisonous and venomous fishes, and another on the chemical investigation of medico-legal cases. In dealing with vegetable poisons, Dr. Harold Scott confines his attention to those which, being used for suicidal or criminal purposes (or taken accidentally), have come to be regarded as practically restricted to the tropics, and also—with appropriate limitations—to those of general employment which are used exclusively in the tropics for a particular purpose (*e.g.*, arrow poisons). As the author says, the subject is as difficult to classify as it is to define, and after due consideration he selects an alphabetical arrangement as the most convenient. For each plant particulars of locality or distribution,

poisonous parts, mode of use, etc., are given, and also, as far as possible, particulars of its action, effects and symptoms, and of treatment, antidotes, etc. There are some good plates, plain and coloured. The account of poisonous and venomous fishes is, of course, lacunar, and there is here too much, not very apt, zoological scaffolding.

The chapter by Mr. W. M. COLLES on the chemical investigation of medico-legal cases is clear and to the point: it sets forth a short systematic scheme for the detection of the common poisons used in the tropics, beginning with comprehensive instructions for the collection and immediate treatment of suspected material.

Taken as a whole, the book is well printed and very well got up, though it is inconveniently heavy—its weight being over 5½ lb. The illustrations are on a generous scale, and with very few exceptions they are first-class and lend meaning and distinction to the text. The index is very complete, though perhaps a little too impartial in its attentions to the subject-matter. In dealing with a single volume it is, of course, impossible to form any judgment of the proportions of its individual parts to the whole work; but taking this one volume it may fairly be said that 80 pages on snakes greatly overtops 224 on medical entomology, and, again, that 224 pages of medical entomology rather overmatches 188 on laboratory methods. If the 188 quite fully sufficient pages on laboratory methods are—as I think they may be—held to fall in good proportion with the projected design of a 2,600-page work on the practice of medicine in the tropics, then one may argue that all the other contributions to this 856-page first volume—except, perhaps, hygiene, sanitation and nursing—are overdone, and the argument does no offence to the (admitted) intrinsic merits of the individual contributions.

The frontispiece portrait of Sir Patrick MANSON is a happy inspiration which will appeal to all students of tropical medicine.

A. Alcock.

KNUTH (P.) & DU TOIT (P. J.). **Tropenkrankheiten der Haustiere. Handbuch der Tropenkrankheiten, herausgegeben von Carl Mense. Zweite Auflage, Sechster Band.** Tropical Diseases of the Domesticated Animals. MENSE's Handbook of Tropical Diseases. 2nd Edition. Vol. VI.]—1921. Leipzig: Johann Ambrosius Barth. pp. 1–889. With 143 text figs. and 4 coloured plates. [Price M. 240—bound, M. 264.]

The first edition of Mense's "Handbuch" was published in the years 1905–6 in three volumes, one of which contained an article of 92 pages by SANDER and HENNIG on Epizootics of the Tropics and Subtropics. The first volume of this, the second edition, was issued in 1913, the second and third volumes in 1914, part of the fourth in 1916, the fifth in 1918, and here we have the sixth entirely devoted to the Tropical Diseases of the Domestic Animals and comprising nearly 900 pages. The inclusion of a veterinary section in a manual of tropical medicine intended for the medical profession is, if not a new departure, at least unusual. The chief reason given by the authors is the prominent part taken by doctors in the investigation of tropical epizootics, so that one may speak of "a common field of work of the two branches of medicine." The need for co-operation, especially in the tropics, between the two branches of the medical profession, using the word to include all practitioners of the healing art, is becoming indeed more widely recognized. Mr. L. E. W. BEVAN has recently written: "The close association and interdependence of our two professions are daily becoming more noticeable, especially in tropical and subtropical countries where the diseases of man and animals are so closely allied," and the Royal Society of Tropical Medicine and Hygiene has recognized this, not only by inviting the co-operation of

veterinarians, but by including among the objects of the Society in a recent revision of its Laws the study of the diseases of the "lower animals" in warm climates.

The authors limit themselves to the diseases characteristic of the tropics and subtropics, and have excluded those which are common also in temperate climates. The inaccessibility of articles published during the war outside Germany was naturally a handicap to them, and they express in handsome terms their indebtedness to the publications of this Bureau.

A word about the authorship. Dr. du Toit is a South African who chanced to be in Berlin in 1914 on the outbreak of war and was there detained by *force majeure* till 1918. The volume, for which material had been collected by Dr. Knuth, was completed during this period.

The volume is in two separate parts weighing, unbound, nearly 3 lb. apiece. The matter is divided into the following Sections—protozoal diseases (in which are included the spirochaetoses and 50 pages on the ticks), diseases caused by ultravisible viruses, by bacteria, by mycoses, by worms and insects, by vegetable poisons, and lastly, diseases of unknown origin. The first Section occupies 587 pages of the total 865 of text.

The trypanosome diseases, or Trypanosomoses as they are called, occupy the first 270 pages, and one recognizes the justice of the phrase "common field of work," for a large proportion of the names cited are those of workers trained in human pathology. The scope of this article is limited because the blood protozoa are being dealt with from a general standpoint in another volume (not yet issued), and the subject of transmission was treated in the first but, as the authors admit, inadequately. An Introduction, in which the subjects of identification and classification are discussed and a useful table of all the known mammalian trypanosomes classed in ten groups (eight pathogenic) is comprised with many useful details, is followed by a series of chapters in which the trypanosome diseases of domestic animals are taken up in turn. A full list of references is appended to each chapter, how full may be judged from the fact that the literature of Surra occupies 9½, that of Nagana 23 pages. The diseases caused by *T. dimorphon* and *T. congolense*, though treated in different chapters, are regarded as identical. After a chapter on *T. ingens* and its congeners we reach one entitled, the trypanosomes found in African big game, which will be of special interest to the medical man. This contains a series of tables illustrating the findings of Duke, Kinghorn and Yorke, Bruce and colleagues, Taute, and Weck, in various regions of tropical Africa, and two comprehensive tables, one showing the 26 species of wild animal—15 are antelopes—which have been found positive by the respective observers and the other the species of trypanosome, as far as it can be ascertained, in each case. The tables seem to have been drawn up with much care and should prove very useful for reference. The next chapter treats, as clearly as this much contested subject admits, the significance of big game and domestic animals in the spread of sleeping sickness. As regards both the *gambiense* and the *rhodesiense* varieties this is held to be less than some authorities claim. The authors do not always commit themselves to a definite opinion. They set down the various observations or views and leave decision to the reader. For instance, the trypanosome classification of Chalmers is given in outline with the bare comment :—The future will show whether this will be accepted.

Leishmaniasis, which in veterinary pathology concerns the dog only, occupies 18 pages; it seems improbable that infection passes with any frequency from dog to man, though the parasites are not distinguishable, and the disease appears to be almost confined to the borders of the Mediterranean.

Piroplasmosis, obviously an important group of diseases, occupies 162 pages: infections of each domestic animal are considered in turn. The Section on ticks, which follows, deals with their biology, the way in which they transmit disease, ticks as ecto-parasites, ticks as disease excitants (tick paralysis), and lastly with anti-tick measures, which are discussed at considerable length. Ticks do at least as much damage, the

authors note, as skin parasites and blood suckers, as they do in disease transmission; they are responsible for the spread not only of the piroplasmoses but the spirochaetoses of domestic animals and two diseases caused by ultravisible viruses—heart water of ruminants and Nairobi sheep disease.

Short accounts of toxoplasmal, coccidial, and sarcosporidian infections bring us to the Spirochaetoses, which do not seem to be of much importance to domesticated mammals; spirochaetosis of fowls is described fully.

The Diseases caused by Invisible Viruses (122 pp.) described are: horse sickness of Central and South Africa, catarrhal fever of sheep, or blue tongue (South Africa), heart water of cattle, sheep and goats (South Africa), ephemeral fever of cattle (Africa), Nairobi sheep disease, and rinderpest; the last takes 56 pages (including 15 of references).

The Diseases of Bacterial Origin (16 pp.) are Malta fever, the South American peri-articular phlegmon of cattle, muscle abscesses in cattle (Guatemala and Brazil), which the authors suggest is the same condition as that described in man in Africa, infectious foot disease in sheep, goats and cattle (Transvaal and Tanganyika Territory) and paralysis of the ostrich (S. Africa).

The Section on Mycoses (32 pp.) has two sub-headings—epizootic lymphangitis of equines, and sporotrichosis. The authors note that the latter is not peculiar to the tropics, but it is briefly described because it is often confused with epizootic lymphangitis and other conditions.

The Section on Diseases caused by Worms and Insects is unexpectedly brief, comprising only 34 pages. The authors explain that though helminth-caused diseases are very numerous among domesticated animals (they instance the tapeworms and Strongylidae), most are cosmopolitan, and those that are limited to the tropics are among the less harmful and are more interesting to the parasitologist than to the medical man. The conditions they discuss are: filariasis (22 pp.), summer sores or habronemiasis, and myiasis. The filariae are those of the dog, horse, ox and camel, with brief mentions of other animals. The myiases described are those that affect the skin.

The Section dealing with Diseases caused by Poisonous Plants (30 pp.), includes too many headings for mention. It is remarkable that of 16 such disease conditions described, all but four appear to be limited to South Africa. Whether this is due to the activity of Sir Arnold THEILER and his colleagues is uncertain, but such seems the probable solution, for readers of this review cannot fail to notice the extent to which South African diseases figure. Dunsickness or ragwort poisoning, described from South Africa and elsewhere, is of special interest to medical practitioners because it affects men as well as animals [see this *Bulletin*, Vol. 17, pp. 250–1].

The Diseases of Unknown Origin are osteoporosis, or bighead of horses, mules and donkeys, lamziekte, or lamesickness, of cattle, jagziekte of sheep (or chronic catarrhal pneumonia) of South Africa, and other rare conditions. The authors point out in a footnote that lamziekte has been shown by THEILER, du Toit and others, to be due to the ingestion of bones and substances of carcasses undergoing putrefaction which contain an active poison produced by bacteria, and is therefore analogous to botulism.

If one is justified in applying to the whole a conclusion drawn from a part—the reviewer can claim no acquaintance with the diseases unrepresented in human pathology and has not read those Sections—it may be said that much information is accurately set down and, as the book is written in the plainest German style so that anyone who has a moderate acquaintance with that language can read it, it should be of value to British doctors in the tropics who are either interested in disease—especially protozoal—in general, or are far removed from their veterinary confrères. The references form a useful feature and there is a short but serviceable index. The matter is well displayed and printed, but the volumes are so heavy that unbound they quickly disintegrate.

A. G. B.

LANGERON (M.). **Précis de microscopie : technique, expérimentation, diagnostic.** 3rd Edition. -pp. viii + 915. With 293 text figs. 1921. Paris: Masson et Cie., Editeurs, 120, Boulevard Saint-Germain. [Price 34 fr. net.]

All those who know M. Langeron's "Précis de Microscopie," will welcome the third edition of this excellent book, the general arrangement of which is much the same as that of the earlier editions, but with the incorporation of many modifications of technical methods and the addition of a great deal of new matter. The chapters on fixation and fixatives have been rearranged and largely rewritten, as also that on the theory of staining.

The value of this book is due to the fact that it is essentially a *practical* guide. The author is not content merely to enumerate the various technical processes suitable for the preparation of an object for microscopical examination, and to leave the reader to take his choice of them ; he tells us the method that he himself habitually uses, and describes this so clearly that even a beginner can hardly go astray. If, however, in spite of the very precise and detailed directions, the result is not perfectly successful, M. Langeron explains exactly where the mistake lay ; indeed, as the result of his own large experience, he anticipates and prescribes the remedy for likely errors before they occur.

The scope of the book is very comprehensive, and the information given is quite up to date in every respect.

The first section deals very thoroughly with the microscope and its accessories. There is an instructive chapter on the use of the illuminating apparatus, a subject about which some confusion prevails in the minds of a good many microscopists. Optical theory is sufficiently touched upon for those who are not mathematicians. The experiments described, which can be repeated by anyone who owns a microscope, illustrate very well such subjects as diffraction images and those produced by oblique illumination, and explain clearly why objectives of high numerical aperture are necessary for the resolution of fine details of structure, and the advantages of apochromatic lenses for critical work. There is a good chapter on the use of polarized light, and, in another, the subject of dark-ground illumination is very fully dealt with.

In chapter III. the author insists upon the importance, in all classes of work, of the examination of fresh, unstained material. He says, quite rightly, that this is the simplest and oldest method in histology, and adds that it is also the one which has led to the greatest discoveries.

About two hundred pages are devoted to the methods used for the examination and preservation of zoological specimens, with special reference to parasitology. Hence the greater part of this section is concerned with the protozoa, parasitic helminths and arthropods. The author reminds beginners that, in the freshwater fauna, they will find at hand material abundant and varied, the study of which will bring familiarity with the necessary technical methods. Like the rest of the book these chapters are very practical, and the methods described are those in current use by experts in the different groups. Useful directions are given for procuring material, either as it occurs in nature, or by breeding methods in the laboratory.

The chapter on cytological technique contains a good deal of new matter, with references to many recent publications. Here, as throughout the book, due credit is given to the authors of new methods, be they Frenchmen or foreigners.

In the introduction, M. Langeron does homage to the skill of such early workers in microscopy as LEEUWENHOEK, who, as Mr. Clifford DOBELL has recently shewn, was able to see *Giardia intestinalis*, the length of which is usually from 10 μ to 18 μ, with lenses which he had made with his own hands.

With a justifiable patriotic pride, the author is able to state that, as regards instruments, stains, optical and other glassware, France is now able

to manufacture everything required for the most exacting microscopical work.

M. Langeron writes so simply and with such good style that even those whose knowledge of the French language is only moderate should be able to read this book without any difficulty. It would, however, be a great boon to many readers if an English translation could be published of this, and of several other volumes (notably M. Brumpt's "Précis de Parasitologie") in MM. Masson et Cie's "Collection de Précis Medicaux." The reviewer knows of nothing quite corresponding to them in the English language, and certainly of no similar books which are published at so moderate a price.

H. J Walton.

Muir (Ernest) [M.D., F.R.C.S. (Ed.)]. **Handbook on Leprosy; Its Diagnosis, Treatment and Prevention.**—pp. iv + 118. With 2 coloured plates and 56 figs. 1921. Cuttack: Published by R. J. Grundy. [Price Rs. 7.] [Agents for sale in Great Britain, H. K. Lewis & Co., Ltd. 10*s*. 6*d*. net.]

This little book, though modest in size and unpretentious in appearance, is a model of what a medical handbook should be. The work of the author in applying the new remedies introduced into India through the researches of Sir Leonard Rogers is already known to readers of the *Tropical Diseases Bulletin* (see Vol. 17, p. 286), and this volume is just what we should have expected from Dr. Muir. Part I is concerned with diagnosis, and is illustrated with excellent photographs depicting all the more common clinical types of the disease. These photographs are of especial value in amplification of the text, where the author treats of differential diagnosis. Fig. 27, illustrating leucoderma, should be compared with Fig. 21 and 22, which show how closely similar may be the depigmentation in leprosy, in leucoderma, and in syphilis. In recording the fact that nerve leprosy is the more common type in endemic areas and nodular in those countries into which the disease has lately been introduced, the interesting suggestion is made that this "is probably on account of a certain amount of immunity being induced in the endemic area . . . while this immunity is wanting in formerly leprosy-free areas." The short description of eye affections in leprosy is particularly valuable in what is, to quote from the preface, "a handbook for the general practitioner in the endemic area."

In turning to Part II, which deals with treatment, we find the author on his chosen subject, and it is here that the wonderful progress of the last few years is made so clearly apparent. The two photographs contrasted in Fig. 32 are of the sort to carry conviction, and records such as these are landmarks in the history of therapeutics. The fruits and seeds of *Gynocardia odorata*, *Taraktogenus Kurzii* and *Hydnocarpus Wightiana*, as well as the leaf and flower of the last of these, are well depicted in a coloured frontispiece, and the trees themselves are shown in excellent photographs in Figs. 35, 36 and 37. The various preparations in use by different workers are discussed, and the author's own preparation, E.C.C.O., is described on page 43. To obtain a mixture sufficiently potent to be of service, one that could be given hypodermically without pain or danger of forming an abscess, and which will remain chemically stable and aseptic over a long period, Dr. Muir prepared the following solution, which, from the initial letters of its constituents, is called E.C.C.O.:

Ethyl esters of the fatty acids from *Hydnocarpus Wightiana*	1 cc.
Pure Creosote	1 cc.
Camphor	1 cc.
Olive oil	1 cc.

"The camphor should be dissolved in the creosote and added, along with the ethyl esters, to the olive oil, which has first been heated for half-an-hour to 96° C. on a water bath and then cooled." The technique for preparing the fatty acids and the ethyl esters of chaulmoogra oil is given on pages 44 and 45. The apparatus used is illustrated in Figs. 39 and 40. But while much space is, naturally, devoted to the new remedies, the author by no means forgets the great importance of general medication and the treatment of intercurrent disease. Ankylostomiasis and malaria must be got rid of where present, the patient must be kept in a cheerful environment and the surroundings must be hygienic if the best results are to be obtained. "It is easy to see that a great deal of harm may be done by the popular idea arising that a specific has been found for leprosy, for the patient will pin his faith to some drug and neglect to regulate his diet and to observe the other important rules of health, so essential for his recovery."

In Part III, "Isolation and Segregation," Dr. Muir raises many interesting points of epidemiology. Here, once more, we are struck with the close similarity between the modern lines of thought as regards leprosy and tuberculosis. To quote from our author, "As an epidemic of cholera in a community which is not on its guard against infection tends to attack all those who are not naturally immune, and those who suffer either die or, if they recover, are rendered immune by the attack, so leprosy, in a much more slow and insidious way, tends to gradually render the community where it is or has been rife more or less immune." Dr. Muir believes the lepers in India to number from half to one million, of whom a tenth are paupers; say 50,000 pauper lepers at the lowest estimate.

The Asylums available are 92 in number, with 8,850 leper inmates. It is, therefore, clear that a great increase in accommodation is necessary. The author is a strong advocate of the colony system, believing as he does that a normal life and healthy occupation are the first necessities in treatment.

We might add that provision of these essentials is the least that the State can be held to owe to the unfortunate leper patient whom it is necessary to isolate from his healthy fellows in the interests of the community.

The volume closes with valuable suggestions and plans for Leper Colonies, and with a scheme for research, a word used too loosely and, in the particular case under discussion, a bad substitute for the less popular word—investigation.

We cordially recommend this excellent book to all medical men and sanitary officers whose sphere of work lies in the Tropics.

S. Lyle Cummins.

LANKESTER (Arthur) [M.D. (Lond.)]. **Tuberculosis in India; Its Prevalence, Causation, and Prevention.**—317 pp. 1920. Butterworth and Co., Ltd., 6, Hastings Street, Calcutta, and Bell Yard, Temple Bar, London. [Price 7–8 Rs. net.]

This little book records the results of two years' study of tuberculosis in India, carried out for the Research Fund Association of the Government of India, during which nearly all the large cities of India were visited and information was gleaned from the medical men practising in them. It is written for laymen as well as medical men, so contains simple descriptions of the subject as well as a large amount of useful information on the prevalence of the disease in India. The writer thinks tuberculosis has increased in some areas, although reliable statistics are not available to prove it. He quotes observations made in Bengal showing that 8 to 10 per cent. of the mortality in some districts is probably due to phthisis, and a still larger amount in towns, the principal cities showing an annual death-rate of 2 per mille and upwards, while post mortem records for a

number of years in Calcutta showed that 17 per cent. of the total deaths were due to pulmonary tuberculosis, and in 8 per cent. more tubercle was found in addition to other diseases ; in Bombay, he found one year's post mortem records showed figures of 35·7 and 9·5 per cent., so there is no doubt that tuberculosis is second to none of the tropical diseases as a cause of mortality in Indian presidency towns, although somewhat less in Madras city, which is far more open and less overcrowded than Bombay and Calcutta, in the worst parts of which the annual death-rate from phthisis is as high as 4 per mille. Somewhat similar figures are given for a number of other large towns ; so the tuberculosis problem is a very serious one in Indian cities, which this work should prove of value in making known. A high incidence among Indian Christians and among the "Anglo-Indian" (new style) community is also pointed out, and a terrible prevalence of the disease in certain overcrowded philanthropic institutions, especially orphanages, is clearly brought out, both the children and the staff suffering greatly.

The controversial and difficult subject of immunity and susceptibility is discussed, and the view is taken that the greatest danger of serious and fatal infections is during the first three years of life, after which infections are common, but are less serious and tend to be recovered from with resulting immunity to further infection ; and in support of this theory the remarkable statement is made that the disappearance of leprosy from Western Europe in the middle ages was apparently due to the gradual immunization of the whole population, although no evidence is brought forward in proof of this very unorthodox opinion.

The interesting and important question of the rarity of bovine tuberculosis in India and its relationship to the prevalence of surgical tuberculosis is dealt with in two chapters, which confirm the well-known rarity of the infection of cattle in India, due apparently to the open-air life they lead in most parts, but figures and opinions are brought forward to show that the comparitive rarity of surgical forms of tuberculosis in the human subject shown in Bengal some years ago does not hold for the North-Western portions of India, especially where, owing to the long cold season, the population lead a less open-air life. As the great infrequency of infection of the milk in India and the almost universal custom of boiling it before consumption practically exclude bovine infections, it is clear that the frequent gland and bone tubercle in parts of the country must be almost, if not entirely, due to the human type of tubercle bacillus, which is believed to gain access through infected dust derived from the expectoration of phthisical patients.

The predisposing causes of the disease are next fully discussed and the influence of social factors in favouring the disease are clearly brought out, especially poverty and overcrowding ; the seclusion of women, accounting for the much greater prevalence of the disease among them, and especially Mohammedan females ; the debilitating effects of early marriage and child-bearing, aggravated by the barbarous conditions under which delivery commonly takes place, leading to the frequent outbreak of phthisis shortly after that event ; sleeping with the head covered up ; overcrowding in certain schools, etc.

The third section of the book deals with the Prevention of Tuberculosis in India. The difficulty in dealing with such a widespread disease dependent so largely on social customs, which can only be very slowly altered, is insisted on, and educational propaganda, which will take long to produce much effect, is advised as the most hopeful means of bringing about improvement. The author is rightly cautious regarding the possibility of effecting much in the treatment of early cases in expensive sanatoria in such a poor country as India, but he points out that in several of the large cities, including Calcutta, wards have been provided for the isolation and treatment of advanced open cases, the removal of which from overcrowded houses is so important in checking further infections, but funds are not available to enable them to be opened ; the provision of wards to be called after the donors unfortunately appealing much more to philanthropic Indians than the no less important provision of funds for

their upkeep, although there are not wanting signs of increased interest in social and medical problems in India which promise well for the future.

This little book should prove of great value in stimulating and guiding into right channels efforts for the amelioration of the insanitary conditions underlying the terribly widespread incidence of tuberculosis in India, and other backward tropical countries.

Leonard Rogers.

We have to deplore the death of Sir Patrick MANSON, on April 9th. Sir Patrick was an original member of the Managing Committee of the Sleeping Sickness Bureau, founded in 1908, and of the Tropical Diseases Bureau which developed from it in 1912, and took the greatest interest in the work of each institution.